ARCHIVES OF OTOLOGY.

A CASE OF BILATERAL CEREBRAL DISTURBANCE OF HEARING WITH APHASIA.

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Translated from *Zeitschr. f. Ohrenhlk.*, Vol. XLIX., 1905, German Edition of these ARCHIVES.

A PATIENT forty-five years of age was suddenly taken ill in 1902 while enjoying perfect health. During a walk he suddenly experienced a peculiar sensation in his body, the ground seemed to sway, and he hurried home in extreme fear. There it was at first supposed that he had gone insane. The physician determined that the man was mentally sound but had become totally deaf so that he did not perceive even the loudest noise. In addition he had lost the power of speech and was able to make only unintelligible sounds. In the absence of symptoms of paralysis, especially of the tongue and of the face, the right diagnosis was immediately made, apoplexy of the hearing and speech centres. In the following weeks the speech improved, until to-day he can be understood, though with difficulty. He is apt to make mistakes, repeats words, employs false vowels, and is very apt to forget syllables. Reading is performed in the same way. Writing is very much less disturbed, while copying is unaffected.

The hearing began to improve after two months. To-day each ear is able to hear the conversational voice. He does not perceive the tick of his watch, but perceives the winding of the watch. Crepitation of paper is heard; writing on a slate, the jangling of keys, the clapping of hands, whistling, the bells of the electric tram, are all heard, though feebler by the left ear than the right. The tone series is not heard on the right side below H, while it is heard until a^1 on the

left side. The upper part is heard by both ears without any defects. Bone-conduction is lost. The drum-head and middle ear are unaffected.

Notwithstanding this relatively good hearing, the patient does not understand anything. Whether he is spoken to or one whistles, whether the hands are clapped, the tuning-forks vibrated, the door bell rings, or a dog barks—all these produce the same unintelligible noise. Naturally he has no understanding for music. He is unable to designate the number of syllables in a word or to tell the beat of music. The intellect is fully preserved. The man is educated and has always been well acquainted with what is going on in the world. On account of this defect in hearing and in speaking it is, of course, impossible for him to associate among strangers.

As regards the disturbance of speech the patient evidently suffers from sensory aphasia—that is, psychic deafness associated with paraphasia. Wernicke has told us of the seat of this disease. It is situated in the area of the left first temporal convolution. In man this is the centre of sound memories, and the impulse passes from this point to the motor speech centre of Broca in the left third frontal convolution, which in turn causes the speaking muscles to receive the proper innervation in order to perform their complicated functions. Therefore in diseases of the sensory speech centre, not only is the understanding for speech affected, but the speaking is incorrect. Presumably the focus has left a part of the speech centre uninvaded, because the patient is still able to speak—a cortical focus. The focus must, however, extend to the medullary radiation which passes to the sensory speech centre, because conduction from the ears to the preserved part of the sensory speech centre is interrupted—a sub-cortical focus. This combination of affected areas is the usual one in aphasia (Sachs).

The disturbance of hearing, of course, is of greater interest to us than the disturbance of speech. The patient became totally deaf for two months in both ears after an apoplexy in the left temporal lobe. How can this be explained? I

think as follows: In 1897, seven years ago, five years preceding this apoplectic insult, the patient suffered from a stroke of apoplexy. The left half of the body was completely paralyzed for two hours, though the function returned after a few days. A remnant of the paralysis persists in a slight drooping of the left angle of the mouth. The left half of the body was then completely anæsthetic and even to-day objects are perceived with difficulty by the left hand and only after prolonged palpation, while the right hand is normal. The prick of a needle is not perceived on the left side as painful. The apoplectic lesion must have been situated in the right internal capsule, though it is impossible to say how far it extended in the medullary radiation and into the temporal lobe. The motor tract was affected by distant action because the paralysis rapidly disappeared. The main lesion was in the sensory tract. In this the tract for the sensations of the skin was only permanently damaged in part. The right auditory tract must have been completely destroyed, because this explains that after the second apoplexy the patient was totally deaf for two months. This is also made probable because after the second apoplectic insult the sensory speech centre and the entire left temporal lobe were rendered functionless by distant action. The partial reappearance of hearing can be explained because the left temporal lobe recovered on the establishment of the collateral circulation. The apoplectic lesion must to-day be limited to a part of the sensory speech centre and to a part of the rest of the left temporal lobe, which, just as the right, simply serves for purely physical hearing.

This case is, therefore, an addition to the few reported cases of focal disease of both temporal lobes and of both auditory tracts. I was able to find only four similar cases in literature. These are the cases of Wernicke and Friedländer, Kahler and Pick, Shaw and Mills, collected by Bastian.

Our case is, however, of value from another point, because it seems to support the view that the auditory nerve of each side is in connection with both temporal lobes, and that means that the auditory nerve, like the optic nerve, only partially decussates. The proof for a total decussation has

been furnished by the physiological experiment on the auditory nerve in the dog. Munk has destroyed the right temporal lobe and the right labyrinth in the dog. The dog thereupon became totally deaf. This can only be explained by assuming a complete crossing of the auditory nerve in the dog, for if the decussation was only partial, the experiment would have destroyed the connection between the right temporal lobe and the left ear, and the left temporal lobe and the right ear. It would also have been lost by destruction of the connection between the right labyrinth and the left temporal lobe. The undivided connection of the left temporal lobe with the left ear would have remained intact, and the dog would not have been perfectly deaf. An observation of Kaufmann's is cited to prove the total decussation in man. A woman seventy-nine years of age suffered from an apoplexy, and thereafter could not hear the watch on the opposite ear. The aural examination is, however, so incomplete that this case cannot be regarded as conclusive.

As a proof for the partial decussation in man we have, first of all, the anatomic course of the auditory tract. It is known that the cochlear nerve, when it has reached the ventral auditory nucleus in the medulla oblongata, in great part crosses the middle line to approach the upper olive on the opposite side, the crossed posterior corpora quadrigemina, and then passing through the internal capsule and medullary radiation to the temporary lobe of the opposite side. We also know that from the ventral auditory nucleus a small part of the auditory nerve passes on to the uncrossed upper olive. The continuation from here to the uncrossed posterior corpora quadrigemina has been proven, though only very few fibres have been discovered in this region. A further proof is furnished by the fact that a man, though he only understands words which he hears by his left temporal lobe, nevertheless hears speech with both ears. In other words, the left temporal lobe is in connection with both ears. It may, however, be objected that this does not show a direct communication of the left ear with the left temporal lobe, because the connection of the left ear with the left tem-

poral lobe might take place from the left or right temporal lobe commissural fibres through the corpus striatum to the left temporal lobe. Our case seems to prove that the left ear is in direct communication with the left temporal lobe so far as a clinical observation can be of value. It is certain that the communication of the left ear with the right temporal lobe in our patient has been permanently destroyed. The patient must, therefore, if his auditory nerve had totally decussated, have been completely deaf in the left ear since 1897. But this is not the case, because he still has considerable hearing with that ear. It is unquestionably poorer than in the right side. This is explained because the left temporal lobe, which is alone suited for hearing, is in a weaker anatomic relation with the left ear than with the right.

Our case has shown that an important centre in the brain may have been completely destroyed without causing permanent symptoms of its defect. Our patient was very intelligent, and after the first apoplectic lesion, which injured the right temporal lobe, did not observe any diminution of the hearing, whether on one side or the other. This is probably correct, for both ears were connected with the left temporal lobe. But when the hearing on the left side was diminished, this does not need to have been so marked as to have been noticed by the patient, and those surrounding him. As an analogy for this remarkable condition, we look in vain for a lesion in the visual centres, because the hemianopsia which appears after a lesion in the visual centre is immediately noticed by the patient. But pseudo-bulbar paralysis furnishes us with an analogy, a disease which is produced by a bilateral lesion of the third frontal convolution and the surrounding parts of the central convolution, namely, the centres which innervate the speaking muscles.

If an apoplectic lesion occurs in the right motor speech centres, the left angle of the mouth will droop for a short time, but then there is no defect visible, because the left centre, on account of its bilateral distribution to the speech muscles, can serve both sides. If, however, the patient

should later suffer from another lesion in the left speech centre, then the entire speech muscles are paralyzed, as occurs gradually in the later stages of the true chronic bulbar paralysis.

ON THE SO-CALLED CYCLIC COURSE OF ACUTE OTITIS MEDIA.

By Professor O. KOERNER.

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ZAUFAL has stated that the course of an acute otitis media is a typical one and corresponds to the cyclic development of the pathogenic agent. When the parasite has reached the full point of its development—that is, when the medium is exhausted, similarly to pneumonia there is a resolution of the inflammatory process characterized by a sudden critical diminution of temperature. This natural course should not be disturbed by paracentesis. I have never observed in an uncomplicated case of otitis media high temperature lasting several days with subsequent sudden drop as occurs in pneumonia. Heine also reports that he has never observed this cyclic course of a middle-ear suppuration. It therefore seems probable that this pneumonic temperature curve if it occurs in an otitis is not caused by the otitis but by a complication such as a pneumonia focus.

It has long been known, and Preising has recently again drawn attention in his classical paper to the fact, that pneumonia occurs with otitis very frequently in childhood and almost constantly in nurslings. It is very easy to overlook these pneumonias as there is usually only a small area involved, which remains undiscovered from absence of cough, expectoration, pain, and dyspnœa. The examination of the lungs does not reveal this area unless it should be situated near the thorax wall.

While I have never observed a pneumonic temperature curve in uncomplicated otitis, in the few cases of otitis with such a curve which have been under my care I have always discovered a more or less latent pneumonia. We must assume, therefore, that a high fever lasting several days with a sudden critical fall in otitis depends upon a simultaneous pneumonia. Then the theory of the cyclic course of an otitis is robbed of its foundation and the subsequent treatment of Zaufal loses its important theoretic support. The following are three cases of otitis media with a simultaneous pneumonia which at the beginning was latent:

Case 1.—H. D., seven and a half years old, was taken ill on March 19th, without known cause with pain in the ears and fever. Four days later on admission the drums were injected, lack-lustre, and bulging. T. 39.8°. A paracentesis evacuated a serous fluid. The temperature then fell to 40.5°. As the perforation seemed to be large enough to permit the escape of the serous discharge, another cause for the fever was looked for, and in the lower lobe an area was found as large as a dollar with distinct crepitant râles. There was no coughing. The temperature remained high for two days and then suddenly dropped to normal. On the 30th of March the patient is cured and the ears are normal.

In this case the pneumonia would not have been observed if it had not been carefully examined for; the otitis would have been held responsible for the fever.

Case 2.—F. S., ten years old, was taken ill on January 18th, with pain in the left ear and fever, and admitted two days later. T. 39.4°; left drum without lustre, thickened, flattened, and somewhat injected. Paracentesis evacuated no exudate. The lungs were examined and found normal. The pain in the ear was relieved. On the following day, T. 40.4°. On the left side between the scapula and the spinal column bronchial breathing. The temperature remained up for two days and then fell to normal. In the area of the bronchial breathing there were crepitant râles and some coughing. On the tenth day he was allowed to go home with a healed drum.

In this case the pneumonia might easily have been over-

looked. The symptoms and the picture of the drum seemed to be those of a severe otitis, but the paracentesis showed otherwise.

CASE 3.—F. B., seven years of age, suffered from pain in the ear and fever on February 9th. Two days later he was admitted to the ear clinic. T. 40.4°. The left drum is pale, clouded, bulging. No details. Paracentesis evacuated a slight serous discharge. The membrane is very much thickened. That evening the temperature had not dropped. The lungs were examined and bronchial breathing was found to the left of the spinal cord. There is no coughing and no pain in the side. On the fifth day there was a dry cough with superficial breathing. An extension of the pneumonia to the right lower lobe accounted for this aggravation. On the eighth day the temperature fell by crisis from 40.7° to 36.2° and then to normal. Notwithstanding the unusually thickened drum from inflammatory infiltration and the severe pain in the ears and the slight stupor, the otitis proved to be mild on paracentesis and in its subsequent course.

The pneumonia might here also have been overlooked until its extension to the other lobe and the onset of the cough with difficulty in breathing.

EXOSTOSES AND HYPEROSTOSES OF THE EAR CANAL AS A CAUSE FOR SEVERE PURULENT OTITIS.

By Dr. MEYER, Hanover.

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THE formerly accepted statement that hyperostoses of the canal occur after middle-ear diseases has recently been opposed by Koerner. The opposite condition, namely, that occluding exostoses can produce middle-ear disease, is not mentioned in literature. Mention is occasionally made of a collection of desquamated epithelium occurring in the canal between the exostosis and the drum, which gives troublesome symptoms but does not disturb the hearing. These retention masses may exert so severe a pressure on the drum as to destroy not only the drum but the ossicles and cause them to completely disappear. This, if an infection should supervene, would seriously threaten the life of the patient.

A patient nineteen years of age has suffered for at least eleven years from an occluding exostosis in the right canal. This had produced no symptoms suggestive of severe disease of the middle ear. A short time before admission he complained of deafness and headache. The right canal was completely occluded by a hard subcutaneous tumor arising from the lower and posterior wall of the canal. The tumor extends very much more external than usual. There are no symptoms of inflammation. Hearing for whisper reduced to 20–70*cm*. At operation unusually extended de-

struction of the middle ear was found. On detaching the auricle directly below the temporal line there was a depression in the bone filled with connective tissue. The tumor could then be palpated. It begins at the level of the porous acusticus externus and springs from the lower and posterior walls of the bony canal. The tumor is easily removed after breaking through its attachments. Behind the tumor the canal is filled with detritus. The drum and the ossicles are absent as well as the outer attic wall. The tympanum contains detritus. The antrum is small and filled with granulations.

In the subsequent course between the third and fourth week symptoms of pyæmia developed which led to another operation, when a small fistula was discovered extending to the sinus. This part of the case will not be described further as it will be subsequently published under another heading. It is remarkable that these severe disturbances of the middle ear and temporal bone caused such slight symptoms. The active infection probably only occurred in the last few days. The indication for operation was the complete closure of the auditory canal and pronounced deafness.

The **second case** was that of a woman thirty-eight years of age who presented large exostoses in both auditory canals. These had existed for at least eight years without causing any symptoms. A short time ago the patient noticed a diminution of her hearing and a slight discharge from her left ear. This led her to consult an aurist who discovered hyperostoses in both canals arising from the posterior and the anterior walls. These tumors met in the lower half of the canal, leaving a small oval opening above. This led to a narrow tract going forward through which nothing of the drum was visible. This passage is filled with moist detritus. The hearing is reduced one half. Examination with the tuning-fork showed a sound-conducting lesion. On irrigating the canal with a tympanic canula the irrigating fluid entered into the nose. As there was no history of any inflammation in the ears, it must be assumed that the accumulations of epidermis behind the hyperostoses had gradually destroyed the drums. The treatment consisted in

daily irrigation, which was followed by the use of alcohol. The condition in the left ear improved. In the right, however, the mucous secretion did not cease and there was tenderness over the mastoid. One year later the simple mastoid operation was performed.

On opening the antrum there was moderate disease. The hyperostosis was not removed. This was followed by healing up. The ear canal is dry and free from detritus, a condition which has persisted until the present time.

HERPES OF THE AURICLE WITH NEURITIS OF THE FACIAL NERVE.

By Dr. T. SARAI, Japan.

Translated from *Zeitschr. f. Ohrenhlk.*, German Edition of these Archives, Vol. XLVI., 1904.

THE simultaneous appearance of a vascular eruption in the auricle and paralysis of the facial nerve has not been frequently noted. The only otologists who have reported observations of this occurrence are Gruber and Politzer. Their reports have, however, not become well known because in the recent books and in Blau's *Encyclopedia* facial paralysis as a complication of auricular herpes is not mentioned.

The observations of these two authors showed that in these two cases it was not an accidental appearance of a facial neuritis and herpes of the auricle, but the two conditions were associated. This latter supposition is made probable by the following case.

A. C., twenty-four years of age, suddenly was taken with severe pain in and in front of the left ear, on October 1, 1902. On the following day there was a left-sided facial paralysis.

On October 4th the following conditions were noted: paralysis of all branches of the facial nerve; loss of taste in the anterior third of the left half of the tongue; position and motility of the palate normal. In the left conchal cavity there were a number of small vesicles with clear contents on a red and swollen base. There was a painful swelling of a gland in the left retro-maxillary fossa; canal, drum, and hearing normal. The pain is still present. The patient is unable to say exactly when the vesicles appeared, as she has kept her ear wrapped up since the onset of

the pain. At first the temperature was somewhat elevated, but it has since become normal. The vesicles healed in about thirteen days without any new eruptions. The pain ceased on the second day of treatment. The facial paralysis, notwithstanding electric treatment, did not disappear before the fifth month.

Politzer in the third edition of his text-book says, on p. 167: "Occasionally together with eruptions there is a paralysis of the facial nerve on the same side, as I have had opportunity of observing in a number of cases. Remaining neuralgias, as are common after intracostal herpes, have come to my notice in only one case, in which the pain disappeared several weeks after recovery."

Gruber's case is reviewed in Blau's *Year Book.*

An anæmic patient thirty years of age suffered with severe pain in the left half of the forehead three days ago, then in the auricle, which became swollen, and two days later the face became twisted. Examination showed that the anterior surface of the auricle was swollen, red, and hard. In the concha there was a group of small, dark-blue, serous vesicles. Those near the canal contained pus. Its posterior wall and the drum were inflamed; total left-sided facial paralysis. On the following day the pain had disappeared after placing a solution of 5% cocain on the vesicles, but a new eruption had taken place on the antihelix The aural condition healed in two weeks. The facial paralysis disappeared almost completely in six weeks. To explain these cases we naturally turn to the herpes of the intracostal nerves. This is generally assumed to be a trophic disturbance by neuritis of the diseased nerve or its intravertebral ganglion, but in these cases the vesicles were not situated in the area of the facial nerve but in that of the auriculo-temporal. Presumably this was a primary neuritis of the auriculo-temporal nerve which sometimes is followed by herpes and in other cases communicates by anastomoses with the facial.

After completion of this article, a study of the literature has shown us that some other cases of auricular herpes with facial paralysis have been described. In addition, recently another case has come under our notice in which the herpes was followed by paralysis of the facial and of the auditory nerve as well.

REPORT OF A CASE OF PURULENT MENINGITIS FOLLOWING RADICAL MASTOID OPERATION.—RECOVERY AFTER OPERATIVE INTERFERENCE.

By R. JOHNSON HELD, M.D., and S. J. KOPETZKY, M.D.,
New York.

R. R., female, aged three years, appeared at the Manhattan Eye, Ear, and Throat Hospital on December 13, 1904. Her family history was negative.

She never had any of the diseases of childhood and always possessed good health until December, 1903, when, following an attack of acute coryza, the right ear began to suppurate. Six months later otorrhœa appeared in the left ear. Since that time until her appearance at the hospital both ears continued to discharge, and because of this, and the foul odor of the discharge, the patient was brought for treatment.

The examination of the right ear evidenced the external auditory canal excoriated, the discharge foul-smelling. When this was cleaned away a thickened, swollen drum came to view, bearing a large perforation in its antero-inferior quadrant, The end of the hammer handle had disappeared through necrosis. Examination of the attic gave evidence of extensive necrosis and the presence of granulation tissue. The right ear, upon examination, was found to be in the same condition as the left, but the involvement was apparently of a lesser degree. A larger perforation was situated in the postero-inferior quadrant, but the ossicles were intact. Necrosis was demonstrable in the attic, and considerable inflammatory granulation tissue was evident.

Bacterially, a smear made from the ear discharge showed a mixed infection, staphylococci and streptococci predominating.

The rhino-pharyngeal space was normal.

The patient was put under the usual rational treatment, and kept under observation. No apparent improvement setting in after four months, operative procedures were instituted. On April 29, 1905, the usual radical mastoid operation was performed upon the right side.

Considerable necrosis of the walls of the aditus and of the tegmen antri, besides the usual amount of cell detritus and granulations, was found. Removing the necrotic tegmen antri, an area of dura, about one centimetre in diameter, was uncovered. The exposed dura showed healthy and was left undisturbed. *No pus was found* between dura and bone.

Because of the exposure of the dura, no flap was made at this time the post-auricular wound, being kept open, was lightly packed and external dressings applied.

Bacterial examination of some of the wound scrapings showed a mixed infection of staphylococci and streptococci.

Excepting a reactionary temperature of 101⅜° F. immediately after operation, the recovery proceeded without noteworthy incident. May 9th the plastic flap was cut and the wound sutured May 19th witnessed the removal of the bandage, and on May 25th the patient was discharged from the hospital. Nine weeks later the patient's right ear was pronounced cured, dermatization having been completed, and the ear found to be absolutely dry.

Meanwhile, both during the patient's sojourn in the hospital, and during the post-operative period, the left ear had received careful attention, and had seemingly yielded to treatment, so that when the child left for the country only a slight discharge was evident from this ear. Instructions were given to continue treatment for this, until further report.

No chance was afforded to see the child again until four months later, when examination revealed the right ear healed, but the left (which had probably been neglected meanwhile) was suppurating, and evidenced an advance in the amount of necrosis.

Here, too, the radical operation was suggested and agreed upon by the parents of the patient, but unfortunately was necessarily postponed because of an attack of scarlatina to which the child was subjected at this time, and it was not until March 13, 1906, that the radical operation was performed on this side. At this operation the usual findings were made. Antrum and mastoid cells were filled with detritus and granulations, the attic wall was necrotic, and the tegmen over the entire antrum and aditus,

extending to the epitympanic space, was absent, disintegrated by the necrotic process.

The exposed dura, in area $1\frac{1}{4}$ by $\frac{3}{4}$ *cm*, was covered with small granulations, and looked darker than the normal. *No pus* was found in this region, and nothing indicated interference with the dura.

The post-auricular wound was left open, cleansed, and lightly packed.

Fear being entertained of an atresia of the external auditory canal, it was split, and the edges of the canal-cut tamponed back. Scrapings from the mastoid gave a mixed infection, staphylococci predominating with some streptococci.

For a week following the operation nothing out of the ordinary was noticeable. The first dressing was undertaken on the sixth day ; the wound found healthy and clean. At subsequent changes of dressings nothing was noteworthy except that healing granulations appeared rather slow. On April 8th the child was sufficiently improved to leave the hospital, and for two weeks thereafter appeared daily for dressings. Recovery proceeded slowly, but steadily. Occasionally some discharge from the *middle* ear was evident at the change of dressings.

On May 8th, when the child appeared at the clinic, the mother reported a restless night having been passed, and that the child had been unaccountably restless and irritable. The dressing showed nothing unusual in the wound. The following night the child cried considerably and was very restless, and vomited. The mother reported the child as having been feverish. For forty-eight hours longer the child was left in the mother's charge, but the symptoms became more marked, a slight retraction of the head becoming noticeable, and for the better supervision and observation of the case the child was re-admitted to the hospital on May 11, 1906.

Status on Admission: The head was markedly retracted. The pupils were dilated, and the right eye deviated slightly outward. The patient was restless and cried considerably. The temperature was 102.4 ° F., pulse 144, respiration 75.

Immediately upon admission the dressings were removed and careful local examination instituted. Considerable pus was found in the wound cavity and dressings. The wound itself was covered with fairly healthy granulations. The dura was blanketed with thickly sprouting granulations of a dark color, the

whole bulging into the wound cavity. Pulsations of the dura were absent.

To assist diagnosis, a lumbar puncture was made, the blood examined, and the condition of the eye fundus inquired into.

The examination of the spinal fluid by the hospital pathologist showed it to flow with but slight increase of pressure, and to contain principally pus, and a large quanity of extracellular diplococci which, however, decolorized by Gram's method, although they appeared like pneumococci (Zabriskie).

The blood examination revealed:

Hæmoglobin	56%
Erythrocytes	5,693,963
Leucocytes	22,648

Differential count:

Large mononuclear lymphocytes	4.0%
Small " "	9.6%
Polynuclear neutrophiles	84.2%
Mononuclear leucocytes	1.8%
Transitional forms	0.4%

The eye fundus evidenced unmistakably double choked disk, with decided swelling at the margin of the optic papilla.

The results of these examinations, taken in connection with the clinical picture which had meanwhile developed—the head retraction more marked, the divergence of the eyes very evident, the stupor and somnolence, with fever,—made for a diagnosis of purulent otitic meningitis.

During the next twenty-four hours the clinical picture fully developed. The temperature remained high, ranging from 102° to 103° F., and after consultation, a hopeless prognosis having been given, it was decided to make an exploratory operation to drain the interior of the dura, and, if possible, afford an outlet for the accumulating purulent exudate.

On May 12th the patient was operated upon, up to the time of operation having been in a condition of stupor or unconsciousness for twenty-four hours. The old mastoid wound on the left side was first carefully curetted and enlarged, the mastoid cavity cleansed of granulations, and the surface of the darkly discolored and bulging dura cleared of all granulations. This accomplished, the lower portion of the squamosal plate of the temporal bone was removed, making an opening 3 by $3\frac{1}{2}$ *cm.* Through this opening the dura evidenced dark and congested.

Considerable bulging was evident but no pus was seen between dura and bone.

The dura was then incised by a horizontal incision extending the entire length of its exposure, along the lower and external edge of the bone wound. Immediately upon opening the dura purulent fluid escaped, in amount, estimated, from one to two drams. Unfortunately, because of the suddenness of its appearance, none of this fluid was preserved for subsequent examination. The brain substance immediately protruded in the wound, and was found soft and friable. The wound was then flushed with very hot saline solution, and the brain substance as far as could be reached was carefully wiped, the brain was lifted upward gently, and wiped underneath, and a strip of plain gauze was introduced between the brain-base and the dura, downward toward the interior of the skull. The gauze was kept in one long strip, the end of which protruded and was finally taken up in the outside dressings.

The mastoid cavity was also washed, wiped, and dressed, and the external dressings applied.

The only part of the technique to which we wish to call attention was the frequent flushing of the entire operative field with very hot saline solution, it being our intention to keep the exposed brain tissue continuously hot.

The next morning the temperature rose to 105°, pulse 170, and respiration 80. Restlessness and lack of sleep persisted, necessitating the administration of opiates.

On May 14th the left ventricle was entered by means of a Quincke needle and canula, and about a dram and a half of purulent fluid removed. Lumbar puncture was now undertaken as a therapeutic measure, and about 40*cc* of a grayish-white, turbid fluid withdrawn. Microscopically this contained, besides numerous red blood cells due to a fault of technique, predominating polynuclear leucocytes, with a few small round cells and an occasional epithelial cell. The cells numbered 410,000 to the cubic centimetre in the following proportions:

Polynuclears	91 %
Small mononuclears	8 %
Endothelial	1 %

Bacterially the fluid contained a few diplococci intracellulares, about three or four in twenty microscopic fields. Cultures, however, gave a mixed infection, the bacteria present being diplococci

and staphylococci, the staphylococci overgrowing the diplococci in the last set of cultures. The first set and the smear gave a Gram negative, intracellular diplococci present in moderate quantity.

Following the lumbar puncture a distinct improvement was noticeable. The respiration fell to 24–30 and the pulse to 120–140, and the temperature curve from 101.6°–103.2° F. Sleep was quieter, but restlessness was still marked.

On May 16th another lumbar puncture was made and 30*cc* of grayish fluid withdrawn. Its examination evidenced polynuclear leucocytes predominating, and some endothelial cells present.

The formed elements numbered 330,000 to the cubic millimetre.

Polynuclear leucocytes	73 %
Mononuclear leucocytes and lymphocytes	25.5 %
Endothelial cells	1.5 %

Bacterially there were mostly staphylococci, but some diplococci which were *not intracellular*. The culture from this fluid gave a pure culture of staphylococci.

The patient's condition improved during the next two days, the temperature dropping to between 99.6° and 101.8°, the pulse ranging from 100 to 140, and the respirations from 26 to 30. Restlessness became less marked and sleep more natural. Additional nourishment was now given and retained.

Lumbar puncture was again performed on May 18th and this time 35*cc* of a clear, limpid fluid was withdrawn containing a very small amount of white sediment, some blood, but no coagula.

Now lymphocytes predominated in the cellular content, many polynuclear leucocytes were present, and a few endothelial cells. In number the formed elements were 295,000 to the cubic centimetre, as follows:

Polynuclear leucocytes	45 %
Polynuclear lymphocytes	52 %
Endothelial cells	3 %

A good many amylaceous bodies were found in the fluid and a moderate number of red cells.

Bacterially, a smear made from the sediment showed a very few small cocci, some single and some arranged in pairs, *none intracellular*. Cultures made in different media gave pure growth of staphylococci.

The eye fundus still evidenced choked disk, but the swelling of the margin of the optic papilla was less marked.

Decided improvement of the retraction of the head became evident, restlessness was still present but less marked, and, generally speaking, improvement continued.

The first dressing was undertaken on May 23d, nine days after operation. The gauze drain was removed from the cranial cavity. The wound looked healthy and was covered with clear, clean, healthy granulations. The dura, while thickened, was taking upon itself a lighter color and appeared only slightly congested. At this period the temperature ranged near the hundred mark, the pulse varied from 106 to 130, and the respiration between 24 and 30.

From this time on improvement progressed slowly and gradually. The intelligence cleared, the temperature gradually came to the normal, nourishment was increased in amount and retained; the rigidity of the spine and the retraction of the head disappeared, the eye fundus cleared—in full, the case became entirely well so far as the meningeal symptoms were concerned.

Locally some trouble was experienced in the wound because of a protrusion of brain substance through the dura. This was carefully pushed back by gradually increasing pressure exerted by the external dressing and packing until finally the protruded brain substance was pushed back into the cranial cavity. The mastoid wound meanwhile healed, until to-day it is dry, presenting only a very small post-auricular opening which at any future time can be closed by proper plastic procedure.

The child was discharged from the hospital on July 8, 1906, because of phlyctenular keratitis due to hospital confinement, and is still reporting at the clinic for observation once weekly.

Aside from the results obtained by the radical measures instituted, this case presents three interesting factors:

(1) The question of diagnosis.

(2) The results obtained from lumbar puncture influencing the prognosis.

(3) The surgical measures to combat the accumulation of purulent exudate in the arachnoidal spaces, together with employment of lumbar puncture as a therapeutic agent.

Many clinicians never differentiate between a purulent meningitis and the epidemic form of cerebro-spinal meningitis, the clinical picture being about the same in both forms. In fact Councilman (*Jour. A. M. A.*, April 1, 1905) holds that

the acute type of meningitis, wherever primary, is more generally due to the intracellular diplococcus than is supposed. Purulent otitic meningitis, a distinct type of purulent meningitis, is that intracranial complication of either acute or purulent mastoiditis which we, as otologists, most frequently meet.

A glance at the clinical picture evidenced by the above history left very little doubt in the minds of those who saw this child at the time of her illness as to the diagnosis; and the examination of blood evidencing a pathological polynuclear leucocytosis, the early presence of choked disk, the bacterial findings in the first lumbar puncture undertaken, and the examination made by the pathologist of the hospital—showing extracellular diplococci appearing like pneumococci—would ordinarily be evidence enough upon which to base the diagnosis. Körner, Macewen, and many other clinicians base the opinion as to the type of meningitis present in a given case upon the origin of the infection.

The story of the findings at the operation on the mastoid of the left side evidencing extensive necrosis, with tegmen destroyed, and the dura exposed and discolored, would account for the origin of the invasion in this case; nor can the period of quiescence intervening between the time of mastoid evisceration and the development of the meningeal symptoms rule out this source of infection, notwithstanding that this period was sufficiently long to permit the child to become apparently well enough to be discharged and sent home, for, as Körner, Brieger, Cohn, and others have pointed out, there are types of otitic purulent meningitis wherein the period of quiescence may be extended for some time. This case evidently would classify with this type of meningitis.

Bacterial examination from the mastoid evidenced a mixed infection, staphylococci predominating; the first examination of the spinal fluid evidenced similar findings, and this alone, in our opinion, is proof sufficient of the extension of the bacterial invasion by contiguity. True, the examination of the spinal fluid on May 14, 1906, gave

evidence of a few diplococci intracellulares, about three or four in twenty fields, but cultures made from this specimen gave mixed infection. Smears made from the cultures gave a Gram negative, and some diplococci intracellulares, but the predominating culture growth was staphylococci. This was the only specimen of spinal fluid which gave the intracellularis. The fluid withdrawn three days prior, and the fluid obtained two days later, showed no diplococci intracellulares present. Both these gave the extracellular diplococcus combined in a mixed infection with staphylococci. Besides, we have seen the adventitious presence of diplococci intracellulares in ear discharge, and in the scrapings from mastoid wounds (Dr. Brooks, pathologist of the New York Post-Graduate Medical School and Hospital, reporting the findings in three of our cases—one from mastoid wound scrapings and two from cases of acute otitis media; and Dr. Zabriskie, pathologist of the Manhattan Eye, Ear, and Throat Hospital, finding these organisms in scrapings from the mastoid wound in one case of ours operated upon for acute mastoiditis). Furthermore, when we remember the harmless presence of this organism in the many observations made on nasal secretions, and its presence in the cases cited above, we can but feel that its presence in this one specimen of spinal fluid was adventitious, and not the evidence of meningeal infection by Weichselbaum's diplococcus. Its absence at subsequent examinations, its absence in the mastoid scrapings, and its overgrowth in culture by the predominating organisms, the staphylococci, strengthen our belief in this opinion.

In this case the lumbar puncture, originally made to assist diagnosis, gave evidence of the nature and progress of the pathological lesion. The amount of pressure was slightly higher than normal at the first puncture made. The bacterial examination revealed the same organism as found in the mastoid scrapings. No cyto-diagnosis was made at this examination.

Hereinafter we have tabulated the results of lumbar puncture.

TABLE.

Date.	Amount.	Color.	Cells to c. c.	Poly. Leucoc.	Small Mono.	Lymph.	Endoth. cells.	Pressure.	Bacteria.	Culture.	Miscellaneous.
May 11.	About 20 c. c.	—	—	—	—	—	—	Not much.	Extracellular Diplococci Pneumococci.		
May 14.	40 c. c.	Grayish white, turbid.	410,000	91 %	8 %	—	1 %	Some pressure.	Few Diplococci intracellulares.	Mixed inf. Dipl. and Strept. Staph. pred.	Blood cells due to faulty technique.
May 16.	30 c. c.	Grayish fluid.	330,000	73 %	11 %	14.5 %	1.5 %	Not much.	Mostly staph. Very few Dipl. extra-cellular.	Staph. pure.	
May 18.	35 c. c.	Clear limpid white sediment.	295,000	45 %	—	52 %	3 %	Not much.	Cocci small, some in pairs, some in single, none intracel.	Pure Staph.	Many amylaceous bodies present.

We note the condition of hyper-polynucleosis in the beginning stages of the intracranial infection. We note the decrease in the number of formed elements to the cubic centimetre as the meningeal condition improved. Within four days three successive punctures gave evidence of the falling off in the total number of cellular elements present (from 410,000 to 295,000 cells to the cubic centimetre). The marked hyper-polynucleosis present in the first fluid subjected to cyto-diagnosis would, in itself, according to the opinion of many authorities (see "Lumbar Puncture," Kopetzky, *American Journal of Med. Sciences*, April, 1906), suggest the nature of the meningeal infection.

We note further the gradual increase in percentage in the small mononuclear leucocytes and lymphocytes, from 8% in the first examination to 52 % in the last examination, and we draw the conclusion that when at subsequent punctures the fluid shows a lowering in the total number of cells present to the cubic centimetre, the percentage of polynuclear leucocytes falling at the same time, and an increase in the percentage of the small mononuclear leucocytes and lymphocytes, then a favorable outcome of the disease is to be expected.

We base this conclusion on the consensus of opinion expressed by many authorities of the significance of the findings in spinal fluid, polynucleosis being considered a sign of an acute and violent meningeal irritation, and the abatement of the polynucleosis indicating the lessening of the meningeal irritation, the lymphocytosis increasing as recovery progresses. Further observations along this line may establish the correctness of this sign as of prognostic value.

One other finding in the spinal fluid is noteworthy. In the last fluid taken, when the case had just passed through its crucial period, and when hopes were entertained for its ultimate recovery because of the clearing in the clinical picture, many amylaceous bodies were noted in the fluid. We know of no observation extant as to these bodies in spinal fluid, nor do we know how to account for them.

Before lumbar puncture became an aid to diagnosis and

therapeutics the advent of purulent meningitis was generally regarded as leading to an unfavorable outcome. In cases which recovered there always existed the suspicion as to the correctness of the diagnosis. But when the purulency of the meningeal invasion is demonstrable, and results of operative interference prove successful, no doubt can exist as to the value of the operative measure instituted. Macewen's classic case, wherein he healed, through the removal of the infected foci, a case of sero-purulent arachnoiditis, gives the basis for the idea that purulent invasion of the meninges is curable by surgical measures (Macewen, German edition, p. 336).

Gradenigo (*Arch. f. Ohrenheilkunde*, No. 47, Cases 3 and 4) reports two cases cured, and Bertelsmann (*Deutsche med. Woch.*, 1901, p. 277) reports one case cured, in which they repeated the surgical procedure as performed by Macewen, but enhanced the results obtained from the surgical removal of the primary foci by the employment of lumbar puncture. Since then others have repeated the procedure with varying success. Körner (*Otitische Erkrankungen des Hirns, der Hirnhäute und der Blutleiter*, Wiesbaden 1902, p. 56) states that in all previous cases of cured purulent arachnoiditis, the cases consisted of those in which the infection of the meninges had not progressed far. He further states that in no case whose report was available to him has he found that the spinal fluid was distinctly purulent.

In our case there was distinct purulency. Following the incision into the dura a dram and a half of pus came away, and while this in itself might mean only an intradural abscess, the extent of the purulent invasion, the general involvement of all the meninges by the purulent exudate, was demonstrated by the results of the ventricular puncture which delivered about a dram of purulent fluid, to say nothing of the recognized organisms found in the spinal fluid as late as six days after the operation.

While it is not our intention to draw conclusions from this one case, we cannot but feel that certain facts were demonstrated by it. Jansen's warning, that it is a mistake, in

beginning meningeal infection, to wait, even where diagnosis is doubtful, until the meninges are overwhelmed, has proven in this case a true sign. We hold that our results are ascribable to the prompt surgical interference, the removal of the primary accumulations of purulent exudate, both intradural and intraventricular. The subsequent recovery of our case was aided by keeping the intracranial pressure as nearly normal as possible through repeated lumbar puncture, in connection with which we must not lose sight of the fact that we increase the bactericidal properties inherent in the fluids, by removing it with its contained organisms, thus causing its reproduction, with heightened antibacterial qualities.

Regarding technique, when indications are such that the dura must be opened, we hold with Körner that the dura should be wide opened. The dangers of brain hernias is of secondary importance to that of a direct inspection of the brain surface to determine its condition.

In conclusion, we present this case as one of purulent meningitis, the route travelled by the invading organism, evident at the operation on the mastoid; the diagnosis substantiated by the findings in the spinal fluid, and the development of the clinical picture. The case was cured by freely opening the dura, removing purulent exudate from within it, together with the removal of purulent fluid from the ventricles, and the judicious employment of lumbar puncture, to keep the intracranial pressure down, and to give evidence not only of the progress of the pathological infection, but by the removal of bacterially contaminated cerebro-spinal fluid, causing its replacement by new fluid with heightened bactericidal properties.

We wish to express our thanks to Dr. Higgins for valuable aid and painstaking care in carrying out the details of the cyto-diagnosis of the spinal fluid, and in making the culture experiments.

A CASE OF ACUTE SEPSIS BEGINNING ON THE THIRD DAY OF AN ATTACK OF ACUTE MIDDLE-EAR INFLAMMATION; EXAMINATION OF THE SIGMOID SINUS; RECOVERY.

By JOHN DUNN, M.D., Richmond.

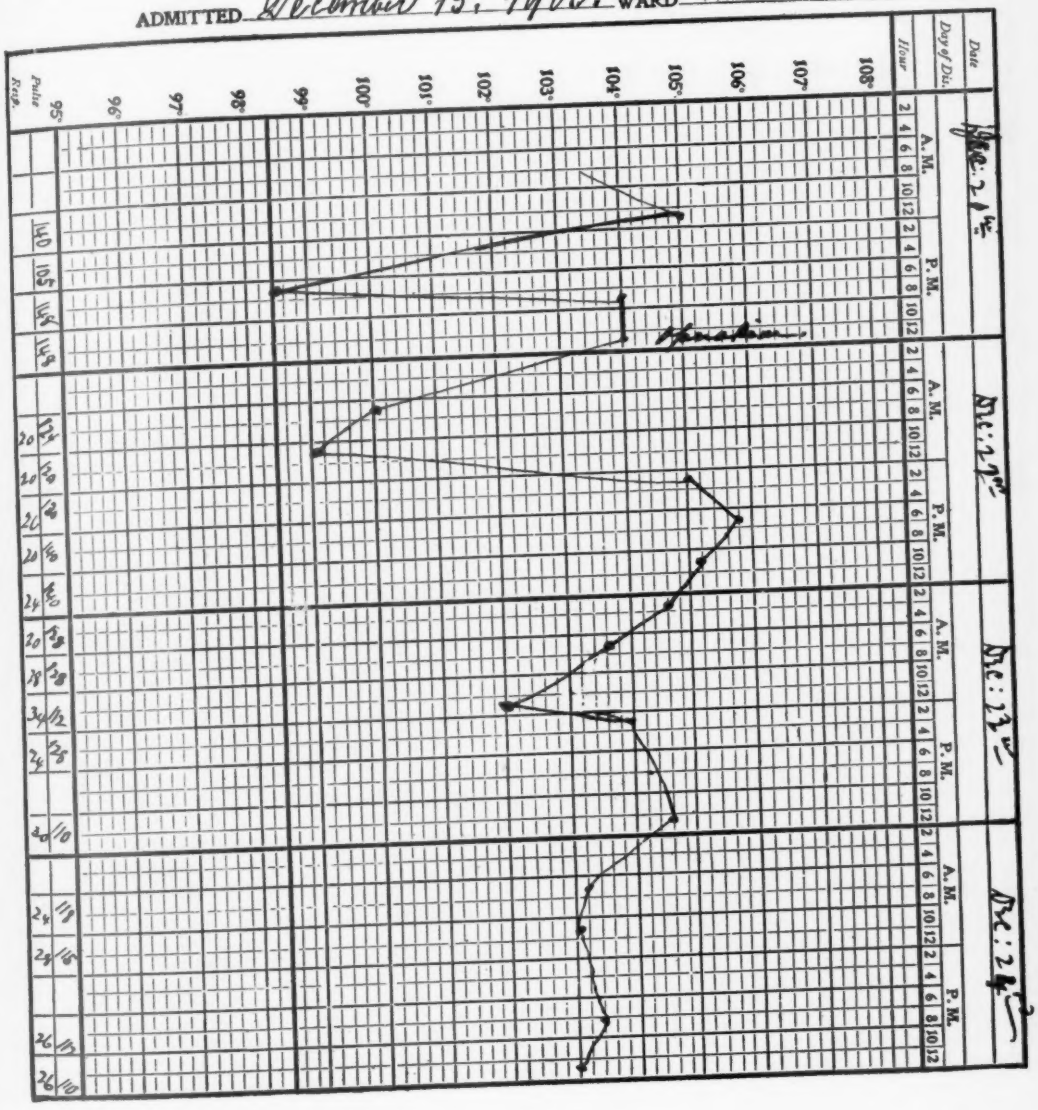
(*With a Temperature Chart.*)

Mr. B. W., aged sixteen, was taken, on the evening of December 15, 1905, with a left-sided earache. The pain was severe and he applied to a medical student boarding in the house with him for treatment. Some simple remedies were given. On the morning of December 18th, the patient had a severe chill, with high temperature. During the afternoon the temperature fell to nearly normal, but only to rise again that evening. On the morning of December 19th the temperature was again low. The boy, however, was suffering so much that during the afternoon, the temperature having risen again very high, Dr. M. E. Nuckols was called in. The morning of December 20th the temperature rose to 104°; there was some little remission in the afternoon. Next day at 12 o'clock the temperature was 105°, pulse 140, respiration rapid. It was at this point that I saw the patient. I found him in a semi-stupid condition. He could be aroused and would answer questions intelligently, but if left alone he would immediately relapse into his former condition. He was sweating profusely, his night-shirt and the bedclothes being soaking wet. Dr. Nuckols informed me that he had several times carefully examined the chest and abdominal cavities and could find no cause for the patient's condition, that the patient had complained much of pain in his left ear, and that he feared, so severe were the symptoms, that meningitis might be accompanying the ear trouble

VIRGINIA HOSPITAL.

NAME AND AGE E.B. 16 years

ADMITTED December 15. 1905. WARD



as Koenig's sign seemed to be pretty well marked. He added that the profuse sweating had been present for more than twenty-four hours.

There were no external evidences of mastoid inflammation; no pain on pressure. The boy, however, had complained of much pain in the region of the left ear. There was no discharge from the ear; nor could any history be obtained that there had ever been. There was no pain over the jugulars. The fundi were normal. I opened the drum but obtained only serum and blood. At six o'clock that afternoon the temperature was normal; pulse 105. At eight o'clock the temperature was 104°; pulse 104. The patient was taken to the Virginia Hospital where at 12 o'clock he was operated upon. All during the anæsthesia the profuse sweating continued, the pulse remaining weak and rapid. The mastoid was found to be normal until a cell opening into the antrum was reached when pus was found. The antrum also contained a foul-smelling pus. The bony walls of the antrum appeared to be healthy. The sigmoid sinus was exposed. The mastoid emissary vein was cut through and bled freely. The sinus, although its wall appeared to be normal, was opened. No evidence of disease could be found. The usual dressings were applied. At 10 o'clock next morning, Dec. 22d, the temperature (rectal) was $99\frac{1}{5}°$, pulse 120, respiration 20. At 6 o'clock P. M., the temperature was $105\frac{3}{5}°$, pulse 140, respiration 24. At 12 o'clock Dec. 23d, the temperature was 102°, pulse 112, respiration 34. It was noticed from now on that the sweating greatly diminished and that although the temperature remained high and the respiration varied from 24 to 34 the pulse grew slower. On the afternoon of Dec. 23d, the patient complained of pain in his right side. Examination revealed no trouble save some bronchial râles. Evening temperature Dec. 23d, $104\frac{3}{5}°$. On the morning of Dec. 24th, some pneumonic consolidation was demonstrable in the lower right lobe. From now on the symptoms were those of pneumonia and not of sepsis, and the patient rapidly recovered.

The above case is an instructive one. The history is one of acute sepsis. The steep temperature curve, the pulse, the profuse almost continuous sweatings, the rapid exhaustion of the patient, his mental condition, taken all together, show this beyond question. Never in the recollection of the patient had there been a discharge from the left ear,

whose drum at the time I perforated it was intact. He had, however, had in this ear for some years past about one attack of earache during the winter. His hearing on this side, as a result, had become slightly impaired. On Friday evening he was taken, while with a cold, with left-sided earache. On the following Monday morning he had a severe chill, and from then on his condition was septic. Undoubtedly the repeated attacks of earache were the result of inflammatory processes which had resulted in lessening the vitality of the middle-ear membranes, including the antrum. It is interesting to note that no pus was discovered in the discharges through the incision in the drum, which healed promptly. Pus was found in the antrum and in a long cell leading to it, but nowhere else in the mastoid process. No evidence could be found of bone disease in the antral walls. It is of further interest to note that the pus formation ceased with the operation and that the extensive postaural wound healed normally and rapidly. There were no visible evidences of disease of the sinus walls, and, save that the venous blood appeared abnormally black-blue, nothing else was to be noticed. That the septic symptoms continued two days after the removal of the pus-focus in the mastoid is probably due to the presence of the already diffused septic material in the blood. It is also interesting to note the relation of pulse, temperature, respiration, and sweating during the period of the sepsis and after its beginning subsidence and the appearance of the pneumonic process. The lessening of the profuse sweating was the first hopeful symptom, the next was the lessening of the pulse-rate, and this even though the temperature and respiration kept high. The patient continued partly delirious the greater part of the time from the 20th to the 23d inclusive.

Treatment: After the operation, for the first three days, every two hours he was given an ounce of whiskey and three drops of spirits of turpentine. Occasionally he refused to take it. After the 23d, the intervals were lengthened. Three times a day his side and abdomen were rubbed with Credé's ointment. To the whiskey and turpentine, peptonized or pre-digested beef was added at intervals. How far the

treatment aided in overcoming the septic poison, I can not say. It is mentioned as part of the history of the case.

Cases of sepsis due to thrombosis of the lateral sinus are common. In these cases, as a rule, ear disease is of long standing and the operator is able to find the bone diseased to the sinus wall or a diseased sinus, or both. In the above case there was no demonstrable diseased bone next the sinus, nor disease of the sinus.

In the ARCHIVES OF OTOLOGY, vol. xxxi., No. 2, in an article on "Toxæmia from Suppuration of the Temporal Bone," Eulenstein says, "Acute toxæmia following suppurative processes in the temporal bone is not common, . . . if we exclude those cases in which there is first a thrombus formation in the sinus or the jugular vein, with a subsequent breaking down of this, and thus systemic infection." He had collected, including the case he then reported, in all eight cases. All eight died. "In two of the cases there were some evidences of thrombo-phlebitis." In the other six there was none. "In the few cases in which the jugular vein was examined in its entirety there were no gross signs of disease." In my case no bacteriological examination was made. It is not to be supposed, however, that we had to deal with an unusual micro-organism, but with some condition of the system which made possible the rapid entrance into the circulation and multiplication of the bacteria or their toxins.

The case reported gives nothing new in regard to the channels by which the poisons gained the general circulation, but from the facts that the accumulated pus was limited to the antrum and one of its adjacent mastoid cells, that there were no demonstrable granulations in the antrum, no demonstrable disease of the wall adjacent, we have a right to infer that the absorption took place through the small vessels leading from the purulent area. As there were no external evidences of redness or swelling of the tissues over the mastoid, no pain on pressure, we can again infer that the absorption took place through the small vessels passing inward from the antrum, *i. e.*, into the intracranial sinuses, the sigmoid and its tributaries. The wonder has always been to me that

descriptions of cases like the one above reported are so rarely met with in otological literature, and yet I have never seen in my practice an exactly similar case. The nearest approach was in the case of a school-girl, in whom, on the third day after a radical operation done for chronic incurable otorrhœa, acute toxæmia developed. She lived only two or three days. I intended at the time to report the case, but misplaced my notes. In this case, also, there were no external signs of mastoid inflammation. Deep subjective pain in the mastoid, occurring in the course of acute otitis media, caused me to open the mastoid, and as I had been waiting only for the school session to be over to operate on the ear for the chronic otorrhœa, a radical operation was done. In the mastoid, pus was found only in the cells immediately adjacent to the antrum, and in the antrum. There was no softening of the walls of the antrum or attic. The mucous membrane of both spaces was much diseased and was, so far as I could judge, entirely removed together with the remains of the diseased ossicles and diseased *M. M.* of the middle ear, whose walls I curetted as thoroughly as seemed necessary. In the second or third day after this operation, the patient began to be nauseated, to complain of sore throat, of severe pain in the region of the liver, and to grow jaundiced. Examination of the mastoid wound revealed in the bottom of the external auditory canal a drop or two of sweetish pus. After twenty-four hours the sinus was exposed and opened. It was found to be, as far as the eye could judge, normal both as to its outward walls and its contents. The patient grew rapidly worse, suppression of urine set in, and death took place within a few hours. *In this case, prior to the operation there were present no symptoms of toxæmia, nor any symptoms pointing to involvement of any of the intracranial structures, nor did any symptoms pointing to their involvement appear during the course of the short illness.* When I exposed and opened the sinus I did not expect to find visible evidence of disease. I operated hoping, but not expecting, to find some focus of absorption other than the opened antrum. The probable explanation of the case is that absorption of the septic material took place

through the opened veins in the walls of the middle ear and antrum, whether through the floor of the middle ear into the jugular bulb or through the antral walls into the intracranial sinuses I can not say. There were no evidences of jugular thrombosis. The operation had been imperfect in one of two ways: I had either failed to remove all of the diseased mucous membrane in the middle-ear space, or I had, in flushing the newly made cavity, been unable to wash away all of the pathogenic organisms there present before the operation was undertaken. Owing to some unappreciated condition of the general system, the bacteria left behind had multiplied in the blood filling the bared cavity, and through the veins leading from this raw surface had found their way into the general circulation. It is to be noted that the absorption did not take place "under pressure" but from a raw surface in the absence of any pressure whatever. There are cases of acute general septic infection secondary to purulent middle-ear or mastoid inflammation where neither inflammation of the walls of, nor thrombosis of, the sinus or bulb can be detected by the naked eye at the time of the operation—and it seems that there are cases where the microscope would reveal no sign of inflammation of the sinus walls. Surely in the second case above mentioned we should not expect to find a continuous phlebitis extending from the lateral sinus to the hepatic veins. There are blood conditions, and the present investigations into the nature of opsonins will sooner or later tell us more accurately what they are, where micro-organisms do pass directly into the circulation and multiply therein without the necessity for phlebitic or thrombotic processes about the focus of infection.

The severe pain in the region of the liver probably places the last case in the class mentioned by S. Maccuen Smith in his article, "Middle-Ear Disease in its Relation to Metastatic Abscess of the Liver and Other Viscera," ARCHIVES OF OTOLOGY, vol. xxxiii., No. 2.

THE DIFFERENTIAL DIAGNOSIS IN OTITIC SINUS THROMBOSIS.

By Dr. F. VOSS, Riga.

Translated from *Zeitschr. f. Ohrenhlk.*, Vol. L., 1905, German Edition of these Archives.

SINCE operations on otitic intracranial complications have proved to be life-saving, the interest of the general practitioner has become more active in these patients. We are, therefore, more frequently, and also at an earlier stage, called in to cases where a complication of an otitis media exists and where severe symptoms have set in. We first must decide whether the severe symptoms are the result of the ear disease or the expression of a severe general malady. We are sometimes also asked to determine whether the severity of the disease can be explained by a latent ear-trouble. Our responsibility is especially heavy in those cases, as, for instance, sinus thrombosis, where it must be decided whether so serious an operation should be undertaken in the case of a very severely ill patient. The following remarks show the kind of cases which have proved difficult to me.

High temperatures and rigors are usually the cause for anxiety on the part of the attending physician. In many cases there was also an enlargement of the spleen. This condition can be present in both forms of sinus thrombosis, the pyæmic as well as the septicæmic. In one of the cases which was operated upon by me the spleen protruded beyond the free margin of the ribs, and was palpable as a soft organ. The splenic tumor may, however, be absent, or show so little increase on percussion that its enlargement

may be doubted. In the pronounced pyæmic form of sinus thrombosis with enlargement of the spleen, malaria must be considered from the point of differential diagnosis. This applies especially in those cases observed in malarial regions. I have several times been in the position of diagnosticating malaria and not sinus thrombosis in acute chronic otitis. If malarial attacks have previously been present, a careful examination will instruct us on this point, and even on the first examination the spleen will be found decidedly enlarged. As opposed to pyæmia, it will be found hard. The dulness will be marked. This picture was presented by the first one of these patients, whom I observed several years ago. It was a boy with chronic purulent otitis, occasional headache, chills, fever, with fall of temperature, marked perspiration, and a hard, palpable spleen. The history gave two previous attacks of this character in the preceding year. The attack was cut short by quinine, and the splenic tumor disappeared. In another case of chronic otitis media the conditions were not so favorable, as it was the first attack of malaria, when, as is well known, the malaria frequently does not show its typical uniform course, and this is only gradually developed.

B. H., twelve years of age, suffered from left otorrhœa after diphtheria, which has continued to the present day. The suppuration is moderate, somewhat fetid, no pain. On April 2, 1902, the little girl had to leave school on account of illness, and was very restless on that night. On the next day the condition was much better. On April 4th, however, in the middle of the day there was severe headache, vomiting, great fear, and a sense of oppression. Temperature at 2 P.M., 40.5°. When I saw the child in the evening for the first time the temperature had fallen to 36.8°, the condition had improved, headache had disappeared, though there was some pain in the back of the neck. A granulation masked the appearance of the drum. The mastoid process is not swollen nor tender, though there is one area of tenderness 1½ inches beyond the mastoid process. Lungs and heart normal. Splenetic enlargement. The spleen is not palpable. The mother informed me that two other children had suffered from malaria in the preceding year. After a day of good health a similar

attack occurred on the 6th of April, with the same symptoms as two days previously. The headache was especially severe, with vomiting. The splenic dulness was larger. On that evening quinine was administered, and on the 8th of April a similar severe attack took place. On the 9th the patient was quite well. During that night there was an attack of headache and restlessness, but the temperature was normal. The spleen was hard and palpable. There were no further attacks.

These attacks ran the typical course at intervals of forty-eight hours, and the spleen finally could be palpated as a hard mass.

In a third case, where the temperature chart unfortunately has been lost, a young boy with acute perforative otitis media suffered from chills, which, however, did not at first appear regularly. The spleen in this case also was enlarged and palpated as a hard mass. The malaria was cured with quinine, and the otitis media healed rapidly.

The following case of acute otitis media and malaria ran a somewhat irregular course.

E. R., twenty-three years of age, has been practically deaf since July 4, 1901, with headache, fever, pain in the chest, cough, diarrhœa. On admission to the hospital on July 11th, the pain was located in the throat, ear, and chest. There was no discharge, no jaundice, no œdema, no glandular swellings, and no sputum. Temperature, 37.8°–38.4°. Pulse regular and uniform. Hearing very much reduced. Mastoid processes tender, especially the left. The diagnosis of influenza made and salicyl given, a compress being applied to both ears. There was no splenic dulness. Temperature remained at 38°. When I was asked to see the ears on July 14th, I found cerumen, which on removal permitted an aspect of a somewhat reddened drum. Mastoid processes somewhat tender, the left more than the right. Carbolic acid-glycerin drops were ordered, and hot compresses. The symptoms on the part of the ear gradually diminished, while the temperature ran the following remarkable course. It remained at about 38° until July 16th, when it rose to 40°, without chills. It then fell and remained at 38° until the 21st, when it rose to 39.6°, without chills. After falling again it rose, July 24th, to 40.4°, and gradually diminished, day by day, to 39°, 38°, 37°, until, on August 31st, it became normal.

The rise of temperature took place every time without a chill. The fall was occasionally associated with perspiration. The spleen is not palpable, dulness uncertain, eye-grounds normal. Malarial plasmodia could not be found. There was some headache.

Up to July 31st the patient had taken three times a day salicylate of soda without any effect on the temperature. Then quinine, five grains three times a day, was administered. On the following day the temperature rose to 39.3°; after that it remained normal, the otitis healed, and the hearing returned to normal.

I am inclined to regard this case as one of an irregular first attack of malaria on account of the striking effect of the quinine, though a splenic enlargement was not determined and the malarial organism was not found in the blood.

With this exception, in all the cases of malaria with otitis a smooth, hard spleen could be palpated, so that I am inclined to believe that a hard spleen is more characteristic for malaria than for sinus thrombosis.

The following case, however, shows that exceptionally a hard, palpable spleen may be one of the symptoms of sinus thrombosis without malaria.

C. H., twenty-five years of age, has had a discharge from the right ear for three weeks. Later she acknowledged that the ear had been running from time to time for years. There was headache for one week, which was more pronounced on the right than on the left side. There was a daily chill during the last four days. On admission the patient appears to be very ill. There is some discharge from the right ear. There is no mastoid swelling or tenderness. Eye-grounds normal. No other symptoms. The spleen is large and hard and protrudes beyond the free margin of the ribs. She is in the fourth month of pregnancy. Notwithstanding quinine, there are one or two rigors a day with a rise of temperature to 39.7° and a fall to 35.4° which produces sweating. The sensorium is free. There are no malarial organisms to be found.

An operation was undertaken on September 24, 1903. A small cholesteatoma was found and the bone overlying the sinus was found diseased. There was a small perisinuous abscess with a necrotic sinus wall. The sinus was thrombosed. It was

exposed for a distance of *6cm* and incised. The healthy jugular vein was ligated. The operation was finished at 11 o'clock, and at 1 o'clock labor pains began. On the following day a dead fœtus was born.

On September 26th the temperature was normal. There was no pain. On the following day it rose to 39.1°, but without a chill.

On September 29th the temperature rose to 39.4°. The wound is infected and covered with discolored exudate. On two later occasions, the temperature rose to 39.1° and to 38.1°, then the general condition improved. The appearance of the wound was much better. This was followed by rapid recovery and the patient was allowed to go home on October 17th. The wound in the neck was healed. On her discharge the spleen was still large and hard. In the course of the next month it gradually returned to the normal.

Remarks.—The hard, palpable splenic tumor which was absolutely without pain, in conjunction with the typical picture of the attacks, rigors, fall of temperature with profuse sweats, was suspicious of malaria. The absence of the malarial organisms and the negative result of the quinine treatment and the frequent attacks made the correct diagnosis probable and the patient was immediately operated upon.

A spleen of so hard a consistency as in this case and still not tender has only occurred in my experience in malaria. I assumed, therefore, that the patient had previously suffered from malaria. This, however, proved to be erroneous, as the spleen without any other treatment returned to the normal. This case, therefore, shows that a hard, palpable spleen may exceptionally be a symptom of sinus thrombosis. The question, What condition was this? may be answered. It was most probably a splenic infarct, though this would be remarkable on account of the absolute painlessness. A splenic tumor as a symptom of pregnancy is unknown to me.

Among other diseases which might be mistaken for sinus thrombosis when complicated with otitis media on account of their temperature curves, tuberculosis must be mentioned. The following is an example.

H. M., seventeen years of age, was taken ill with measles on February 27, 1902. She entered the hospital on March 4th, with a temperature of 40.1°, which dropped to 37.5° on the following day. There was considerable catarrh of the lungs, which gradually diminished on the following days. Then marked variations of temperature occurred. The exanthem had disappeared on March 9th with slight cough. There was pain in the right ear. On March 11th the patient suffered from a severe chill, lasting half an hour, and the temperature then fell from 40.3° to 35°. I examined the ears on March 12th, and found the otitis media diminishing, the mastoid processes tender, sensorium free, no venous bruit, still some pulmonary catarrh. Paracentesis evacuated no exudate. A few tubercle bacilli were found in the sputum, and on March 15th there were distinct signs of an infiltration of the right apex. The otitis rapidly got well. The previous history stated that the patient had herself always been well, but she gave a distinct tuberculous history. Death after about a year.

Another temperature curve of interest was that of a child three and a half years of age, who in the first week of scarlet fever acquired a bilateral otitis media with total loss of both drums. Without particular glandular swellings, no nephritis, and no affection of the lungs, on the twenty-fifth day sudden remitting temperature set in without rigors. I had occasion frequently to examine the little patient up to the time of her death three months later, and found moderate mucous discharge in the ears, but no tenderness, no eye signs, and the sensorium perfectly clear. As there was no indication, I could not see the necessity of an operation. The child became greatly emaciated, and the autopsy revealed a disseminated tuberculosis. Meninges and sinus completely free.

Forselles regards the differential diagnosis between sinus thrombosis and septic endocarditis as very difficult, as in the latter condition the same symptom-complex is present as in sinus thrombosis. Most important is the examination of the eyes, where hemorrhages are met with in the rectum and conjunctiva. In this case the examination of the blood does not help us, inasmuch as both diseases may be caused by the same organisms. I have had no experience with this

association of endocarditis with otitis media, nor, so far as I recollect, have I seen a similar case reported in literature.

Curiously as it may seem, hysteria must be mentioned from a differential diagnostic point of view, not purely from a theoretical aspect, but because I have seen this mistake made.

A young woman, nineteen years of age, claimed to suffer from severe pain and hyperæsthesia about the ear, especially over the mastoid process, with a daily chill; though the drum was intact, the hearing was normal, and no discharge had occurred. I observed this same patient seven months later. She had then been operated upon and had lost the drum and her hearing, and was desirous of further operation. She still claimed to have rigors, though her temperature remained normal and though her general condition in this long period had not suffered in the least.

Puerperal processes and even pregnancy may cause difficulties in diagnosis and lead to errors.

A healthy young woman at the end of her pregnancy suffered from an acute purulent otitis media, which was accompanied by very severe headache, rigors, with pyæmic temperature. The induction of premature labor was frequently discussed, though there were no abdominal symptoms. The labor occurred normally, though the general condition had not improved. Then, after numerous consultations, the mastoid operation was performed, but the patient died.

Though this was very likely a grave ignorance on the part of the aurist, who apparently had no idea of the possibility of a sinus thrombosis, similar cases of chronic otitis in puerperal fever, with headache and slightly disturbed sensorium, may cause the greatest difficulty in diagnosis.

A woman in the end of the thirties in her first labor suffered from high temperature without rigors and left-sided headache. She had had a purulent otitis on both sides since childhood. The sensorium was free, though she became gradually somnolent. Pulse 100. There were no changes in the ears. The abdomen was soft without pain. There was no thrombosis of the lower extremities. I consulted with the attending gynecologist for one

week, and, although each one of us declared that his branch was not responsible for the fever, we could not say that it was absolutely improbable. Ten days later a tablespoonful of pus was discharged per rectum and the situation was cleared.

If, instead of the pyæmic fever with rigors, the temperature is of the high and continuous type, the diagnosis is then more difficult, and errors, especially with typhoid fever, are frequently possible, as the general impression which these patients give is that of a severe typhoid case. Of my cases two were treated for a long time for typhoid fever. In both the spleen was enlarged, when palpated very soft; in both the sensorium was half clear, and in one of the cases there were a few spots like roseola. Possibly for differential diagnosis here Bezold's statement is of value, namely, that the exudative otitides occur usually at the end of the third, or between the third and the sixth, week of typhoid fever. Bezold was able to find mention of only three occurring before the twentieth day. If the history, therefore, states that the acute otitis began first, and that the high temperature then occurred, with increase of the pain in the ears and the head, the diagnosis of sinus thrombosis is likely. In doubtful cases Widal's test may be tried, or it is possible that the continuous fever will change to an intermittent type.

Another disease which comes into question is pneumonia, especially when it develops simultaneously with the otitis or directly after.

The conditions are comparatively simple for the aurist if the pneumonia was diagnosticated before. It is then perfectly clear that the height of the temperature is influenced by the pneumonia. If the temperature varies, or if rigors are present, then the condition is more difficult, and the attending physician is apt to believe that it must emanate from the ear. The following is a striking example:

A boy twelve years of age was taken ill on January 18, 1905, with measles and moderate catarrhal symptoms. The rash appeared on the 18th. The temperature was rather low, some-

what over 38 °, and on the 20th fell to 37.2 °. On the 21st, with a temperature of 36.5 ° there was some pain in the right ear. The temperature shot up to 40 °, with a chill. On examination the hammer was red and the hearing was diminished. On the following day there was a chill, with a rise of temperature to 40.5 °, which dropped to 37.6 ° in the evening. The entire drum was red and swollen. Carbolic acid-glycerin drops and hot applications were prescribed. On January 23d severe chill, temperature 40 °, in the evening down to 36.7 °. Pain in the left ear, slight redness, some cough. Some râles in the posterior half of the left lobe. On the 24th a chill with a rise of temperature to 40.7 °. On the 25th the temperature rose to 40.5 ° again. The otitis media in the right ear is diminishing. The drum is only slightly red, lack-lustre. There is no pain in the left ear, the drum is red but not swollen. In the lower half of the right lobe posteriorly moderate dulness, crepitant râles, but no bronchial breathing. General condition excellent.

In the subsequent course the otitis gradually disappeared while the temperature kept its remittent character for three days, and then the crisis set in with subnormal temperature.

The absence of a marked dulness as well as the bronchial breathing made the general physician hesitate with the diagnosis of pneumonia. He was therefore inclined to ascribe the irregular course of the temperature to the otitis, while the reverse was the case. There was no spontaneous perforation and paracentesis was not performed.

The conditions are more difficult if the pneumonia is central and has not been diagnosticated. In this case the lungs must be examined carefully every day.

C. G., seven years of age, has just recovered from measles and the temperature has been normal for several days. There is some cough. On March 21st the patient appears poorly. On the next day there is some pain in the left ear with rise of temperature to 39.8 °. On the 23d there is pain in the right ear with a temperature of 39.1 °. Paracentesis was performed on the following day, bloody serous discharge. The temperature on the following morning dropped to 37.8 ° and rose to 39 ° in the afternoon. On March 26th it remained at 39.6 °.

There was slight stupor, no headache, the mastoid processes were not tender. In the course of March 26th there was severe coughing, but not until March 27th did the daily examination of the lungs reveal pneumonia in the right apex, and on the same day the crisis occurred. The otitis was rapidly recovered from with normal hearing.

In this case there was pneumonia in the apex which did not become manifest until six days after the onset of the otitis media. I have observed similar conditions more frequently in the central onset in the lower lobes, especially in children. Some of the cases have recovered without leading to perforation or requiring paracentesis. In other cases the severe pain in the ears and mastoid tenderness led to paracentesis without exerting any definite effect on the temperature. The subsequently confirmed pneumonia explained the conditions. I do not believe that these cases should be regarded as complications of an ear lesion, at least that the intervening factor is not the sinus affection. I must add that in the other cases which I have seen no infectious disease preceded. Leutert has shown that erysipelas could lead to erroneous diagnosis. I have observed four cases of acute otitis media, with rigors and high fever as a complication, which were sent to me for operation. In all these cases the auricle was not invaded by the swelling, but the erysipelas extended over the scalp, with a prolongation over the mastoid process, causing swelling, redness, and pain simulating deep disease of the mastoid process. Rapid involvement of the auricle, usually on the next day, cleared the diagnosis.

Finally I want to mention the use of antipyretics as factors in rendering the diagnosis difficult. They may sometimes simulate a pyæmic temperature curve when there is no pyæmia. It is well known that antipyretics have this effect on some individuals, that the temperature after a fall rises with a rigor. Since the introduction of pyramidon in the treatment of typhoid fever, I have seen several cases where this temperature was complicated with otitis media. When the pyramidon was discontinued, the typical tempera-

ture curve characteristic for typhoid returned. Krannhals has shown by numerous investigations that these pseudopyæmic curves occur especially in inflammatory complications of typhoid, such as pneumonia plus otitis media. We must, therefore, remember that, especially in the last, the temperature is without serious significance.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE

REGULAR MEETING, OCTOBER 11, 1906, DR. GRUENING IN THE CHAIR.

Presentation of Cases.

Fracture of the temporal bone by A. P. VOISLAWSKY, M.D.

R. H., admitted to the S. R. Smith Infirmary, Staten Island, on the 28th day of August, with history of having received an injury, being found unconscious, and brought in an ambulance. Physical examination revealed a bloody discharge from the right ear, which became purulent on the second day. Patient continued in stupor one week, during which time he vomited a great deal. A diagnosis of fracture of the base was made by Dr. Townsend, attending surgeon. It was a week before the patient asked for food. From the 8th to the 25th day he complained of headache at base and over right temporal region. Ear irrigated with bichloride, 1:5000 solution, three times a day. On the 25th day the attending surgeon noticed a slight swelling above the right ear, exceedingly painful to the touch. Temperature 100.2 °, the first rise since admission to the hospital.

Patient was taken to the operating room, the right side of head shaved, and under cocaine anæsthesia an incision in the periosteum was made, two inches in length, and about an ounce of pus welled up. Upon cleansing, a marked fracture was visible, extending through the outer table of the temporal bone. Following this line of fracture, a probe was passed beneath the periosteum, and with the aid of a speculum could be plainly seen in the middle ear.

Had it not been for the infection, which was due to a purulent otitis of long standing, the fracture of the temporal bone would

not have been discovered. The patient made an uninterrupted recovery, and with the exception of the chronic middle-ear suppuration the head symptoms have disappeared.

The case was shown simply as a fracture of the temporal bone extending into the middle ear.

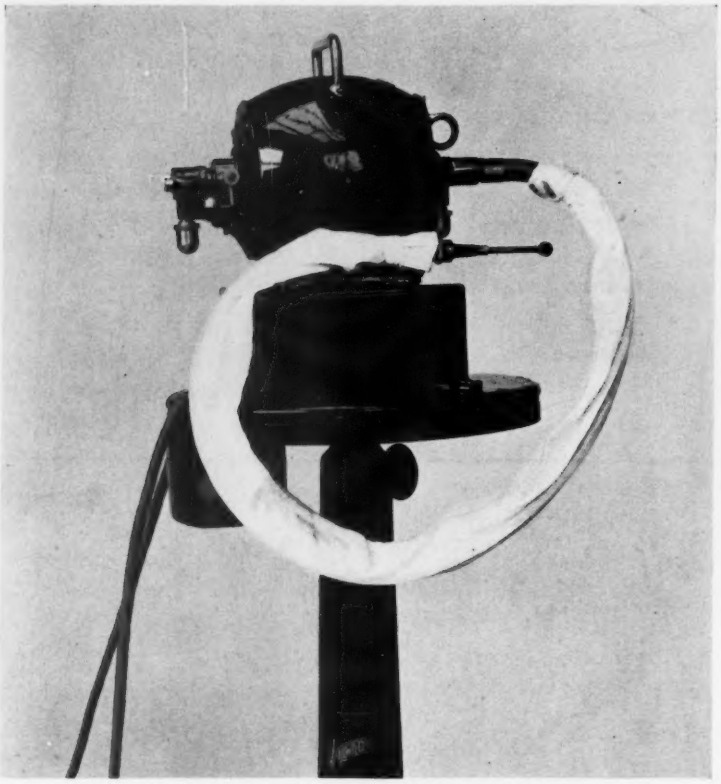
Dr. PHILLIPS asked if he understood Dr. Voislawsky correctly in saying that except for the operation the fracture would not have been discovered. It was clear that from the beginning the symptoms pointed to a fracture of the base. Of course these cases are of comparative frequency—he had himself seen two within the last twenty days. One of these was a man who had been riding horseback and reached over to regain his stirrup, fell, and struck upon his head. He was found two hours later in a ditch by the roadside. He did not lose his consciousness but was unable to rise during that time, on account of a severe vertigo and vomiting, which continued for three days. He had a discharge of serum mixed with blood from the auditory canal. The accident occurred six weeks ago, and the man has now regained his equilibrium so that he can walk about. The bone conduction is absent on that side, and the external auditory canal reveals evidence of the fracture, which also must have extended through some portion of the labyrinth. The symptoms of vertigo and vomiting, and the bloody serum discharge were sufficient evidences of the fracture.

Dr. VOISLAWSKY replied that he had not presented the case as a fracture of the base, but for the fracture of the squamous portion of the temporal bone, which he thought was a rather unusual occurrence.

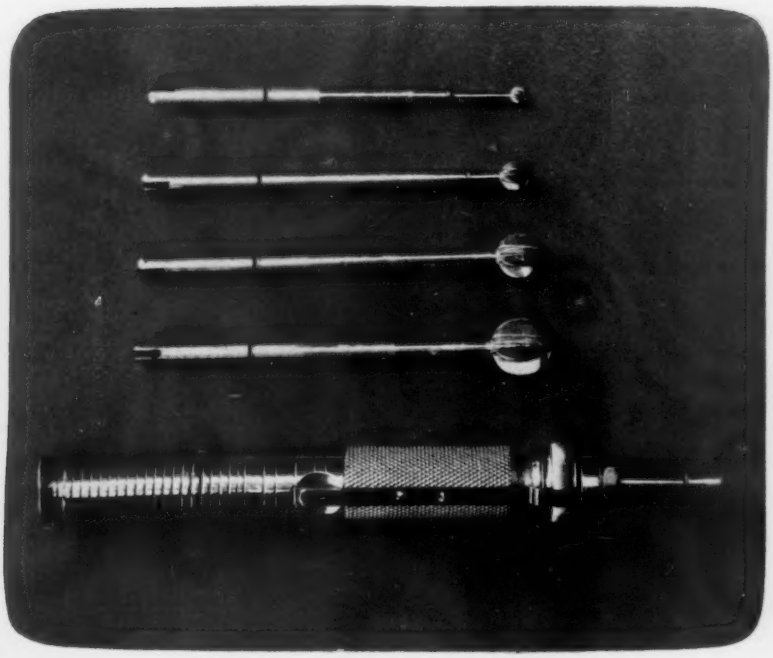
Demonstration of an improved motor drill for mastoid surgery. W. SOHIER BRYANT, A.M., M.D. *With two figures on Text-Plate V.*

The manner of using the apparatus was demonstrated on a preserved specimen. Dr. Bryant said that some of the best operators in this country and in Europe—among them Dr. J. ORNE-GREEN and Sir WM. MACEWEN—have used surgical drills to do a large part of their work, but this method has never been popular and has always been subject to a number of objections, —the chief is the mechanical difficulty of keeping the burr from heating and clogging. The present machine has some advantages over the older engines. There is a powerful motor, a flexible shaft which is detachable, a handpiece which can be detached

Text-Plate V. To accompany article by Dr. W. Sohier Bryant, on "Demonstration of an improved motor drill for mastoid surgery," to face page 562 of Archives of Otology, December, 1906.



The Motor Burr assembled with sleeve on the shaft



The burr drill and hand-piece, reduced one-half

and sterilized, and a set of burrs which cut rapidly with an insignificant amount of clogging. There is also a foot switch in the circuit, which allows the surgeon to use both hands in manipulating the instrument, while the foot controls the motor; and a sterilized sleeve which is easily drawn over and tied to the flexible shaft. The motor is a powerful one-sixth horse-power motor of the Victor Electric Co., who also furnished the shaft and handpiece. The foot switch was added at Dr. Bryant's suggestion, and the burrs were made especially for him. With this instrument, the time for the removal of the bone in a mastoid operation is very much reduced, especially where it is hard or sclerosed. The surface left by the burr is smooth and needs no further treatment. The burr does not injure soft tissues unless they lie on a hard substance, therefore its use is not a menace to the structures adjacent to the operative field. It would not be wise, however, for a surgeon to attempt the use of the machine until he had previously tried it several times on the cadaver. The knack of guiding the burr is readily acquired.

Dr. DIXON took the time with a stop watch while Dr. Bryant performed a mastoid exenteration on a head with a large pneumatic mastoid. The time consumed in removing the bone, including the whole tip, one third of the posterior meatal wall, opening the cells which extended high and ran far back, and opening the antrum, was five minutes and sixteen seconds.

Dr. MEIERHOF said that he did not wish to condemn this appliance, but that the specimen on which Dr. Bryant had made the demonstration was a rather porous mastoid and it required a certain amount of pressure to make it cut through the bone, and personally he preferred the old methods rather than to trust to so powerful and dangerous an appliance. After the bone had been cleared away, this might be very well for cleaning away all sorts of recesses, but it seemed dangerous to go in with a large burr and remove the cortex in one sweep, as had been done in this demonstration, and he did not feel inclined to use the apparatus.

Dr. COBURN inquired whether the bleeding was increased or diminished.

Dr. GRUENING inquired whether the burr would jump.

Dr. BRYANT replied that he had not noticed that the bleeding was affected one way or another; and that the burr would jump,

but that this could be so guarded against that no injury would result.

Demonstration of the movements of the Eustachian tube. W. Sohier Bryant, A.M., M.D.

Demonstration of a new gas-ether inhaler. By V. C. Pedersen, M.D.

Dr. Pedersen presented a new form of bag inhaler for etherization and its sequences, in which by the principles of evaporation and unobstructed respiration the patient is relieved of additional work in breathing.

A full description of this inhaler will appear shortly in one of the medical journals.

Case of mastoiditis due to Friedlander's (?) pneumococcus. George Sloan Dixon, M.D.

Dr. Dixon said that in May, 1905, he had reported to the Section a case of meningitis following middle-ear disease with mastoiditis, the infection in which was stated as Friedlander's pneumococcus. This report was published in the Archives of Otology under the title of "Report of a Case of Panotitis Resulting in Meningitis, with Pathological Findings." In closing this report he made the statement that the case seemed to call for an investigation of his bacteriological examinations during the previous four years, and quoted as follows:

"These were found to comprise about 1050 cases of acute and chronic purulent otitis with and without mastoiditis: 2.75 % of the infections were Friedlander's pneumococcus, or more properly the bacillus mucosus capsulatus; fifteen cases, or about 50, had existed forty-two days and over before operation. Of these, two had perisinuous abscess with Bezold perforation; one had perisinuous abscess and cortical perforation with subperiosteal abscess; four had epidural abscess, one of which died of meningitis; one had panotitis and died of meningitis; and one had brain abscess, which also died; six cases had subperiosteal abscess.

"Of those cases which had existed under forty-two days, four promptly recovered after paracentesis, but mastoid operation was required on the remaining ten, and all did well except one patient who died of pneumonia."

Dr. Dixon stated that he had been observing these cases for several years and was struck with the frequency with which this germ gave serious trouble, and wished to call attention to a case

which he regards as a type of this particular form of infection.

He further noted that this germ was very likely to be present in diabetic cases.

Authorities seem to be confused as to what is Friedlander pneumococcus and what is encapsulated streptococcus. Some say that Friedlander's pneumococcus is decolorized by Gram, and some that it is stained by Gram. Some figure it appearing as a streptococcus, another will call it a coccus, and another a bacillus,—but the fact remains that the germ under consideration appears to fit the description closely enough to class it under bacillus mucosus capsulatus, and in some respects resembles the Friedlander type.

It is still being studied, and the present report is preliminary to the completed investigation which will be published later.

This particular case occurred in the practice of Dr. John L. Adams, and in a manner is typical of this form of infection. Of course there are deviations occasionally, as in all other types.

Mr. C., a retired merchant, sixty-one years old, presented himself for treatment at Dr. Adams's office, and a short time after, *viz.*, July 13th, entered the New York Eye and Ear Infirmary for observation.

The membrana tympani of the right ear showed a perforation which had been present since infancy, and the hearing on that side was poor.

He had suffered from indefinite pain in the left ear for six months, but a week before he was seen by Dr. Adams he began to have severe pain, deafness, tinnitus, and tip tenderness on that side. Myringotomy had recently been performed, and there was profuse discharge.

Physical examination was negative.

When he entered the infirmary a second paracentesis was done, he was put to bed on liquid diet and irrigations with warm boric acid solution ordered. No ice was used.

His temperature in the morning of the 13th was 98.2°, in the evening 98.6°, with respirations 18, pulse 70 to 72.

On the 15th of July pus from the left canal was examined and a form of streptococcus found. On the 19th the pus showed the same except that the germs seemed to be fewer in number. On the 20th a germ similar to Friedlander's pneumococcus was found, and Dr. Adams was notified at once.

A blood examination made later in the day showed Hb. 85 %, red cells 5,300,000, white cells 15,700; differential count, small

mononuclear 9.4%, large mononuclear 6.2%, transitionals 2.8%, polynuclear 81%, eosinophiles .4%, and mast cells .2%.

Dr. Dixon thought that the mastoid should be opened at once. Of course Dr. Adams demurred, as would most surgeons who had not studied the ravages of this germ, and very properly wished further consultation. Dr. Dixon said that he did not expect to find any one who would agree with him that the case should be operated immediately, even with a polynuclear count of 81%, as it was quite common to see recovery without mastoid operation in other forms of infection where the polynuclear count was 80 or 81%, with a leucocytosis of 16,000 to 17,000. He does not think that leucocytosis alone amounts to much as a diagnostic factor in mastoiditis,—but that the polynuclear percentage is important.

In the afternoon of the 20th, Dr. Adams called in Dr. Robert Lewis, Jr., and Dr. Dixon. They found the temperature, pulse, and respiration normal. The mastoid tenderness and pain had disappeared, and the hearing on the affected side had improved, but the upper posterior portion of the canal-wall was red and sagging, and the membrane had a red, "beefy" appearance. The discharge was profuse. Dr. Dixon recommended immediate operation, Dr. Lewis was not in favor of this, and Dr. Adams agreed with Dr. Lewis.

The patient wished to know whether a delay of twenty-four hours would make any difference. Dr. Dixon thought not, and it was decided to wait that length of time.

The next day, the patient's condition was the same, and Dr. Dixon still held to the propriety of an operation, basing his opinion principally on the nature of the infection which had been subsequently reinforced by the polynuclear percentage, and the appearance of the canal and membrana tympani. The patient was operated on that afternoon, and the following condition was found:

The subcortical tissue was found as a mass of purulent broken-down bone-cells. The mastoid tip, median groove, antrum, zygomatic root, roof of the antrum and aditus, and cells above the knee of the sinus were all diseased and practically liquefied. The whole was removed with a curette down to the inner plate and sinus groove which was of healthy hard bone. The mastoid tip had to be entirely removed, as also the roof of the attic and antrum, exposing the dura over an area of about 20*mm.*

The patient made an uninterrupted recovery.

Dr. Dixon believed that if the patient had waited another twenty-four hours meningitis would have supervened.

In conclusion Dr. Dixon said, we have a number of such cases at the infirmary. The ear symptoms may not amount to much, or the pain may be at first severe. All acute symptoms may subside, and the patient thinks he is doing well, but the discharge continues, as a rule. After going on this way for a considerable time, say four to six weeks often, the patient thinks something ought to be done to stop the discharge, or improve the hearing, as in the case I reported in 1905. That patient had passed the acute stage and was being treated in a surgeon's office for the resulting deafness. She was suddenly seized with dizziness and was taken to the infirmary. Aside from the dizziness there was nothing to indicate the possible necessity of operative interference. Suddenly, however, the temperature went up, and before anything could be done meningitis had developed and the patient died in thirty hours. The autopsy showed all portions of the bone badly involved.

It must be borne in mind that Dr. Adams's patient was improving. He had no pain, no temperature, pulse and respiration normal, mastoid tenderness had been present but had disappeared, and the only indications for operation were the presence of the encapsulated germ, the sagging of the canal-wall, and the polynuclear count of 81 %.

In concluding, Dr. Dixon said that another case had been brought to his attention to-day which fits in so well that he must mention it. A patient called at the office of Dr. Whiting, and when the mastoid was pressed to elicit tenderness the thumb went through the cortex. The patient still declined operation because there was no pain. A few hours later the mastoid was opened, however, and was found to be practically liquid. It was another case of the same kind of infecfion.

Dr. MEIERHOF said that the Section was under obligations to Dr. Dixon for presenting this phase of the importance of bacteriology in purulent otitis. Dr. Dixon's laboratory was practically a clearing-house for a large number of such cases. All the cases in the New York Eye and Ear Infirmary passed through his hands. There are some otologists who, while they will have a bacteriological examination of the pus made, lay very little stress upon the value of the examination, and in some cases

where a streptococcus infection is found they attach no more importance to it than to any benign infection. In the cases just presented by Dr. Dixon one could see certain definite results following this form of bacterial invasion, and it places the bacteriology of the discharge of the ear on a much more definite basis. When the value of a particular form of invasion is known, it forms a valuable guide for treatment, in spite of the fact that the typical symptoms may not always be present.

Dr. BRYANT said that he regretted he had not known that Dr. Dixon was going to present this subject, as he would have liked to have looked up some memoranda of similar cases which he had seen and operated upon. His experience with this variety of infection had been similar to Dr. Dixon's, and all his cases had been very grave.

Dr. GRUENING inquired whether there had been applications of ice, as this might in a measure account for the anæsthesia. Dr. Dixon had said that the swelling of the canal remained and also the sagging of the upper walls, yet they were cases of retention of pus, and the tenderness had disappeared. This sometimes happens under the application of ice, and should always be considered in connection with these cases. He himself had not laid much stress upon the importance of bacteriological examinations, as he felt that a clinical examination sufficed in the majority of cases. The bacteriologists at Mt. Sinai Hospital claim that the pus from the discharge is almost always contaminated, and prefer to wait until the ear is opened. Dr. Gruening felt that the clinical examination was much more important than the bacteriological examination, but if the latter adds important knowledge in forming a diagnosis we should certainly avail ourselves of it.

Dr. DIXON replied that he did not think ice had been used in the case. He admitted that the discharge from every ear was contaminated, but if we found a rapidly growing streptococcus infection it was certainly more virulent than an ordinary pneumococcus or staphylococcus infection. Of course, if we undertake to cultivate and isolate all the germs found in every case of otitis media, a small army would be required to do the work, but every day in the New York Eye and Ear Infirmary he was impressed anew with the practical and useful side of bacteriological examination of smears of the secretion from the ear.

As to this patient, he had no temperature, could hear better, and everything pointed to his well-being and the resolution of

the case. It was doubtful whether many surgeons would insist upon the necessity of a radical mastoid operation in an important case where the patient seemed to be getting well. He would not be willing to do it himself unless there was something to back him up. The cases which he had spoken of were only three out of a dozen or so that he had noted within a very short time. There had been many more lately, and they were all of that peculiar type, the mastoid cells could simply be "scooped out." In such cases, when meningitis occurs—which is very likely to follow—the course is very rapid, the patients sometimes dying within a few hours, sometimes within thirty hours after the onset of the fever. In cases of this type it was important to know that one germ could be picked out which was likely to cause much trouble, and when that is present perform an exploratory operation. The speaker maintained that it made no difference what condition the patient was in, if the discharge continued and was found to contain this encapsulated germ, the mastoid should be opened

Dr. GRUENING said that he was struck with the fact that in all these cases of infection with Friedlander's bacillus there had been no tenderness in the mastoid. It was known to all that there may be cases with swelling of the drum, bulging and sagging of the canal, and yet without fever or headache, or any other symptoms but persistent tenderness, and that alone would in some cases be a guide for operation. He would operate at times where there was persistent tenderness. If a case ran along without this tenderness we should lose an important diagnostic symptom, and he would like to know if he was correct in understanding Dr. Dixon to say that none of these cases showed any tenderness.

Dr. DIXON replied that in a certain proportion of the cases there was absolutely no tenderness; but in others there would be a certain amount of tenderness, and in these there was found great destruction of the bone. Not all the cases were absolutely anæsthetic. It might be possible that this lack of tenderness was due to the germ being able to manufacture some kind of anæsthetic, which, after a certain time when the acute symptoms subside, would cause anæsthesia, and though the trouble was still going on, no tenderness could be elicited.

Dr. GRUENING said that at one time he had maintained that persistent tenderness was a guide, and he had sometimes failed

to operate because no tenderness could be noted, but quite a number of mastoid bones are so formed that the tenderness cannot be elicited. The cortex may be very thick and the cell very far from the periphery; the cell may be filled with pus; and this happens in old people whose cortex is very thick.

Report of a case of purulent meningitis following a radical mastoid operation. Recovery after operative interference. Drs. HELD and KOPETZKY. Published in full, pp. 531-543.

Dr. PHILLIPS said that naturally he had been much interested in this case and had watched it carefully, and felt compelled to admit that, notwithstanding the fact that he was on record as an unbeliever in the recovery of cases of purulent meningitis of otitic origin, this was a genuine case of recovery. He had seen this patient within twenty-four hours after the first symptoms appeared, and she presented all the characteristic symptoms of purulent meningitis, and he had given the opinion that it would be a fatal case. Drs. Held and Kopetzky, who were present, then suggested that if this were the feeling it might be well to undertake a very radical course of treatment. This was readily consented to, with the result just heard.

In his opinion there could have been but two other conditions present, rather than the diagnosis which had been made. It might have been a simple subdural abscess, or it might have been a case of epidemic cerebro-spinal meningitis, from which recoveries have been reported. He thought, however, that the report from the ventricular and spinal fluid negatived the diagnosis of subdural abscess; and the fact that the characteristic germs were not present except at one examination would discard the diagnosis of cerebro-spinal meningitis.

There were one or two points he wished to emphasize, the most important being the attempt to remove the fluid from the ventricle. He hardly saw the necessity for doing so in this case, and rather felt that the importance of this procedure was overestimated. It is not unattended with danger. He had had occasion, at about the same time this case was under treatment, to remove the ventricular fluid from a patient who was practically dying. A small portion of fluid was removed for purposes of examination, but he felt that the death of the patient was hastened, and at the post-mortem examination which followe

it was found that a blood-vessel had been wounded and a hemorrhage into the ventricle had taken place.

Dr. HARRIS said that he did not think this report should be allowed to pass without additional commendation. It seemed to him to be one of the most carefully prepared reports that he had heard for a long time, and he wished to congratulate the authors upon their success in a case of so much importance. He did not think that this subject was receiving sufficient attention in this country. We have many forms of meningitis, and are inclined to treat them too pessimistically; but in Germany they have recognized the possibilities that the essayists have brought out to-night. This has been demonstrated in Politzer's clinic, and Alexander reports a series of cases cured of purulent meningitis, about fifteen in number.

At the same time, even with such strong facts as had been brought out by the essayist, he remained sceptical, as he could not reconcile a cure with the appearance that he had many times seen of purulent meningitis upon a cadaver. It seemed to him that in a case of established purulent meningitis the conditions are such that no operative procedure can be of any avail. This opinion, however, did not make him feel that the course which had been pursued in the case just reported was not the correct one, for he believed it had been demonstrated very clearly that any meningitis demands such a course where there is the slightest hope of a recovery. We have too often erred on the side of conservatism. He hardly agreed, however, with the weight that Dr. Kopetzky attached to the value of lumbar puncture. As he had watched the results obtained in our own city and also abroad, it seemed of very doubtful value. We could only claim that it has a certain diagnostic value. As a therapeutic agency he doubted whether Dr. Kopetzky had gained anything more than the relief of pressure, which could have been secured in other ways, such as opening the mastoid and eliminating the field of infection, together with opening the dura and letting out the cerebro-spinal fluid.

Dr. HELD, referring to the remarks that had been made in regard to the danger of ventricular puncture, said that when the puncture was done sufficiently low and in the descending horn of the ventricle, there did not seem to be any probability of injuring the middle meningeal artery. The question brought up by Dr. Harris as to the therapeutic value of lumbar puncture

could not be unquestionably agreed to. It seemed reasonable that it was done, not only to relieve the pressure, but by the removal of this fluid a new fluid was caused to be formed which had more or less bactericidal power, and thus contributed to the cure of the meningeal disease.

Dr. KOPETZKY, in closing the discussion, said that the possibility of a subdural abscess had been absolutely ruled out by the finding of pus in the ventricle. In drawing the pus from the ventricle a canula had to be used; the pus in the ventricle was not connected at all with that under the dura; there was no fistula apparent. Of course there always was danger in performing ventricular puncture—the middle meningeal artery might be wounded; but the procedure was safe if you entered the descending horn of the ventricle. As to the condition of cases seen on the autopsy table, they were not the ones by which to judge of pathological findings in the meningitis of the living. Moribund cases, or those which are about to go on to exitus, are not the ones upon which an operation is suggested, but rather upon those in which the complications were just beginning, and where the picture presented demonstrates a meningitis. Here results can be obtained. This has been established by the work of Macewen, Alexander, and the others who had been quoted. If only one case is saved, it is well worth the attempt. The saving of the life of this little child is well worth the effort made.

In any given case of lumbar puncture the significance of the findings varies, but at least one can, by this means, keep the intracranial pressure down—can keep the general condition good, and gain time, and with a local counter-opening you can give nature a chance to assert herself, and the patient may recover. In this, however, as in any other procedure, the interference must be prompt, and should not be delayed until the brain and meninges were too deeply involved.

REGULAR MEETING, NOVEMBER 8, 1906, DR. E. GRUENING, PRESIDENT, IN THE CHAIR. DR. W. H. HASKIN, SECRETARY.

An unusual type of acute mastoiditis. C. G. COAKLEY, M.D.

D. S. female, twenty months old, was referred to me on the evening of April 17, 1906, by Dr. E. FOSKETT of this city. The mother stated that the child had been perfectly well until the

day before, when she noticed a marked swelling behind the left ear. The child had eaten and slept well but apparently had a slight fever. Examination showed a well-nourished child with a mass behind the left ear in the mastoid region. The auricle stood out at nearly right angles to the skull and at first glance presented the typical picture of a mastoiditis that had perforated the cortex with pus formation beneath the skin. On palpating the mass, however, it was found practically not to be tender, of extreme hardness, no fluctuation, nor pitting on fairly firm pressure, skin very slightly movable. The mass seemed to be confined to the temporal bone, its maximum prominence just above the level of the external auditory meatus. From here it extended upward to the temporal region in front of the auricle, fading away above at the upper limits of the temporal bone. There was no redness of the overlying skin. Examination of the drum membrane showed the least suspicion of hyperæmia. but without bulging. The right drum membrane was normal in appearance, nose and throat normal. Temperature at the time of examination was 102°, pulse 140. The absence of any systemic symptoms, the slight involvement of the drum, and the dense hardness of the mass were very different from the ordinary picture of mastoiditis. On the morning of April 18th, Dr. Robert Lewis, Jr., saw the patient. The swelling behind the ear at that time was somewhat less, still the same slight hyperæmia of the drum and a slight bulging posteriorly and superiorly. He advised incising the drum, which I did under chloroform anæsthesia. The canal was thoroughly sterilized with a solution of bichloride followed by alcohol, and a free incision made in the posterior half of the drum membrane. There was practically no bleeding, merely the escape of a small amount of turbid, gelatinous secretion which was collected on sterile cotton, spread on slides and submitted to Dr. E. K. Dunham for microscopical and bacteriological examination. Dr. Dunham reported a mucoid secretion with few pus cells and a pure culture of a germ which had all the appearances of the *influenza bacillus.* The child was taken home with instructions to irrigate the ear with hot 1:5000 bichloride solution every two hours and to apply hot applications in the form of a poultice behind the ear.

On April 19th the child was brought to my office. Rectal temperature had risen to 103°; no pain. Dr. Foskett reported

that at the first irrigation only was there any discharge with a small amount of stringy, mucoid material; subsequent irrigations brought nothing from the canal. The swelling behind the ear was of the same size and hardness as when first examined, and with a faint redness of the skin probably owing to the poulticing; practically no tenderness on pressure. In view of the temperature and high pulse rate, ranging from 140 to 160, the mother was advised to have an exploratory incision made with a view to determining the nature of the process, which in all probability was an atypical mastoid involvement. As the mother had herself been a victim of acute mastoiditis, for which she had been operated with the result of total destruction of hearing on the affected side, she said she would rather see her child dead than undergo such an operation attended with loss of hearing. Although I explained the dangers of letting such a condition go without operation, no persuasion on my part could induce the parents to allow the child to be operated on. The mother then took the child to the New York Hospital where it was kept under observation until April 23d. I am indebted to the New York Hospital for the following extracts from the record: Temperature varied on April 19th from 104° at 2 P. M. to 103.8° at 5 P. M. and 104.8° at 6 P. M. The ear was irrigated; a small mucous clot came out. On April 20th, the temperature ranged from 103° at 4 A. M. down to 100½° at 6 P. M. The ear was irrigated, no pus or mucous; slept fairly well, no nourishment taken. On April 21st, the temperature ranged from 102° to 101½°, leucocytes 15,000, polynuclear 71%. On April 22d, the temperature ranged from 101.8° in the morning to 100.6° at night. Swelling behind the left ear shows slight tenderness, discharge from left ear moderately profuse; diagnosis mastoiditis, and on April 22d the surgeon at the New York Hospital strongly advised a mastoid operation, but again it was refused and the child was removed from the hospital to her home.

Dr. Foskett saw the child on April 23d and gave me the following history: Temperature at 3 A. M. 103.2°, 11 A. M. 102.3°; left ear discharging freely; swelling behind ear somewhat reddened, slightly tender; child very restless at night, complaining of some pain in *right* ear. I saw the patient on April 24th at noon. Temperature 105°, moderate redness, slight tenderness of swelling behind left ear, considerable purulent discharge from left canal. Right drum membrane red, bulging in posterior and

superior portions. Immediate operation was advised, to which the mother consented.

Operation at 3 P. M. Usual incision behind left ear. After incising skin, knife passed into a rather dense infiltrated area of about the consistency of untanned leather which practically did not bleed. The maximum thickness of this infiltration opposite the external auditory canal was $\frac{5}{8}$ of an inch. On peeling the periosteum forward and backward the ordinary shaven-beard appearance at about the middle of the mastoid area was seen with a perforation of the cortex $\frac{1}{8}$ of an inch in diameter. No pus or softened area was found along the track of the incision or between the periosteum and bone. The whole of the mastoid cells were infiltrated with a gelatinous, ropy mucoid material; the bone was soft and easily removed with curette. The mastoid cell area extended rather far posteriorly, and anteriorly into the zygomatic process. The inner table of the mastoid was not softened in any place. The sinus was not exposed. The wound was packed with iodoform gauze, sutures taken in upper and lower angle, ordinary aseptic dressing applied. Smears were made from the secretion in the mastoid and sent to Dr. Dunham for examination. He found, as in the first examination of the discharge, a very small proportion of pus cells, considerable amount of mucus, and a pure culture of a germ which had all the appearances of being the *influenza bacillus*. A free incision was made in the right drum after sterilizing the canal. A couple of drops of ropy muco-pus exuded. Smears from this showed pus and diplococci. The right ear continued to discharge for about two weeks. The patient's temperature remained in the neighborhood of 102° for two days and then dropped to normal and stayed so. Sutures were removed on the fourth day, packing on the 6th. It was found that the infiltration external to the bone had absorbed without breaking down. On May 11th the wound had completely cicatrized. The child's hearing is perfect in both ears.

Dr. GRUENING said that these granulomata were frequently seen after mastoid operations in children that were not well nourished or well cared for, and that he was loth to accept the diagnosis of syphilitic granuloma for such cases. He had seen many of them get well without antisyphilitic treatment, and supposed that others had also. This little girl was the child of healthy parents, and showed absolutely no trace of syphilis.

There was merely a wound that did not heal, and this was not altogether unusual.

Dr. COAKLEY said that even after the head was shaved he could not tell from the feel of the mass that it was soft tissue, or that the whole outer table of the mastoid had been pushed out—there was such a large mass between the bone and superficial skin.

Dr. ROBERT LEWIS, Jr., said that he had seen Dr. Coakley's case, and that the feature of interest in it was the bone-like hardness of the infiltrated area behind the ear; it seemed more like an osteoma than like œdematous tissue.

Dr. A. A. BERG reported a case of **otitic abscess in the left temporo-sphenoidal lobe.** Mrs. F., forty-two years old, German, married, had suffered from a left-sided chronic otorrhœa for many years; the discharge from this was never very profuse; it was intermittent, and of a sero-purulent character; she never had any pain in the ear or mastoid region. There had been no ear discharge for a number of weeks prior to the present illness. On May 5, 1906, she suffered with headache, nausea, vomiting (the latter not projectile in character). She had no dizziness, fever, or chills. Between May 5–20 she was more talkative than usual, but was always rational. On May 20th, at breakfast she complained of headache. By the afternoon she had forgotten people's names; there were no convulsions. She vomited once (not projectile). In the evening she could hardly speak at all. Dr. B. Sachs saw the patient in consultation with her physician, Dr. Charles Goodman on May 23, 1906. He found the patient in a condition of semi-stupor, with slight rigidity of the neck, a slight degree of left facial paralysis, and some weakness of the right upper and lower extremities, and with increased reflexes in the right arm and leg. The pupils were equal, and reacted to light; there was no paralysis of the eye muscles, but there was a slight optic neuritis.

The semi-stuporous condition was found by Dr. Sachs to be due largely to an entire inability of the patient to comprehend speech. Spontaneously she spoke correctly enough, but occasionally used words which she did not intend to use. There was no ear discharge, though there were a number of old scars on the left drum membrane.

The history of chronic otorrhœa, the optic neuritis, the headache, and vomiting led Dr. Sachs to diagnosticate a cerebral abscess. The sensory aphasia led him to locate it in the temporo-

sphenoidal lobe, and the weakness of the right upper and lower extremities, and the increased reflexes therein, together with the paraphasia and the absence of convulsive seizures, induced him to believe that the abscess was encroaching upon the fibres leading from the motor centres—in other words that the abscess was a subcortical one in the temporo-sphenoidal lobe.

At the time of operation these diagnostic points were all substantiated.

Operation, May 24, 1906.—Though there was no external evidence of mastoid affection, this bone was first of all exposed and opened. All of its cells had been obliterated, and its structure was sclerosed and very dense. The sinus was exposed, and was seen to be about ⅛ of an inch behind the posterior wall of the bony meatus; the antrum was entered with a probe, but its complete exposure would have entailed a very slow and laborious dissection of the sinus, and, in view of the fact that no evidence of disease was seen in the mastoid or antrum, it was decided to at once proceed to deal with the cerebral condition. The mastoid incision was therefore prolonged upward and forward in a curved direction, so as to expose the squamous portion of the temporal bone, and the soft parts and periosteum were reflected from this for a space of about 1½ inches in diameter. Starting from the roof of the antrum and tegmen tympani, the squama was removed with chisel and rongeur forceps over an area as outlined above. There was no visible cere bral pulsation and the dura bulged considerably. With a large-sized trocar aspirating needle, a puncture was made into the temporo-sphenoidal lobe, about 1 inch beneath the cortex. About 2 drams of sero-turbid fluid were first aspirated, and then thick, creamy pus. The needle was left *in situ*, the dura incised for about ½ inch alongside of the needle, a grooved director passed along the needle into the abscess cavity, and then the opening enlarged with a dressing-forceps. About two ounces of thick, creamy pus were evacuated. Drainage at the most dependent point by soft-rubber tube and two narrow strips of plain sterile gauze; closure of soft parts down to emergence of drain; dry aseptic dressing. The patient was not at all shocked by the operation. There had been very little hemorrhage.

The next morning the patient's sensorium was much clearer; she was able to talk and recognize familiar objects, though unable to name them. In the afternoon she was able to name

some things. Rapid recovery took place. In *forty-eight hours the aphasia had almost entirely disappeared*, likewise the weakness of the extremities and the left facial paralysis. The drainage tube was removed after ten days, the abscess cavity rapidly contracted, and the patient was discharged cured after three weeks. At present she feels entirely well. There is no ear discharge. The defect in the squama of the temporal bone has been almost entirely filled in by new bone. There is no hernia cerebri.

Comments.—From a neurological point of view the case is of interest:

1st. Because of the rapid recovery of speech after the evacuation of the abscess.

2d. Because the abscess corresponds in every way to clinical findings prior to operation. Dr. Sachs especially insists upon the presence of sensory aphasia for the diagnosis of left-sided temporo-sphenoidal abscess. He further insists that this symptom should always be especially examined for, and that the physician should not be deceived as to the absence of aphasia by the fact that the patient is able to talk coherently. This symptom, he is of the opinion, cannot be made out unless it is specially examined for.

From a **surgical** standpoint the case is of interest because it enables us to open a discussion as to the best manner of approaching and draining temporo-sphenoidal abscesses and cerebral abscesses in general.

The two cardinal requisites for the successful surgical treatment of cerebral abscess are (*a*) free exposure of the area in which the abscess lies, and (*b*) drainage of the abscess cavity at its most dependent point. In the present accepted fashion of operating upon temporo-sphenoidal abscesses both of these prime conditions for success are easily and readily fulfilled. The old route for access to the temporo-sphenoidal lobe of Macewen, viz., through the squama of the temporal bone, proved itself insufficient because of the fact that, through this exposure, drainage of the abscess cavity could not be effected at its most dependent point. Körner's original operation, viz., through the roof of the attic and tegmen tympani, was similarly unsatisfactory, because, though it sufficed for drainage at the most dependent point, it afforded insufficient exposure of the affected brain area. The combination of both these operations, viz., removal of the roof of the attic and tegmen tympani and enough of the squama

for a free exposure of the temporo-sphenoidal lobe (the operation of Macewen), fulfils both requisites for successful treatment of temporo-sphenoidal abscess.

It is different, however, with abscesses which are situated in one or another of the cerebral lobes nearer to the vertex of the skull. The surgeon in such cases trephines over the site of the abscess, and, after evacuation of the pus, has to drain the abscess cavity up-hill. Under such conditions there is, of necessity, retention of pus in the cavity, and the latter tends to burrow, and gives rise to secondary pus formation. This accounts for the far less favorable results which surgery achieves when we have to deal with abscesses situated in the higher parts of the brain. Inasmuch as lowering the head cannot be tolerated by the patient long enough to satisfy the requisite of good drainage, and inasmuch as the present method of draining such abscesses is insufficient, it is necessary in such cases to make a counter-opening through the skull and brain tissue over the most dependent part of the abscess cavity and establish drainage through such a counter-opening. This procedure has, as far as I know, not yet been practised, but I will certainly do it in the next case of this kind I am called upon to treat.

Discussion on Dr. A. A. BERG'S case of **temporo-sphenoidal brain-abscess.** Operation by Dr. E. GRUENING. Recovery in three weeks.

Dr. MCKERNON said that when this matter was discussed last year before the Academy, the five otologists who spoke said that they did not drain through the roof of the antrum or the tympanic cavity. Certainly he himself never did. He regretted very much that he had not arrived in time to hear all of Dr. Berg's report, but there was one point to which he took exception, namely, that there was no danger of hernia cerebri when a large area was exposed. He thought there was danger of having an infection take place, for a hernia cerebri is due to infection, and there is this danger when a very large area of bone is removed. It had occurred in some of the cases in his service, but not frequently.

Dr. GRUENING said that he had seen the patient, and she had certainly made a very good recovery. The wound was entirely closed, and there was no discharge. The patient was perfectly well. The general surgeon supposes that the otologist only goes into the abscess of the brain through the antrum roof and

tympanic roof, but this is not the case. The otologist has good results, because he does open the abscess freely and removes the squama of the temporal bone as well. He does not dwell upon that, however, but upon the fact that he drains by gravitation. The drainage which Dr. Berg proposes to employ in these cases is possible, as is evidenced by our cases. We often find it necessary to go through healthy brain tissue in order to reach the abscess, and then drain it through this route, and no harm results. There is no reason why a similar opening might not be made from the side in order to drain abscesses developing in other parts of the brain. As to the optic aphasia, this is only found when the abscess is in the temporo-sphenoidal lobe of the left side. He thought that in all cases reported by otologists this symptom had been noted. Sensory aphasia is easily discovered. Patients speak very fluently of things which concern them and others, and also mention things they cannot see, but they cannot name the things that they do see. They may speak of a watch, a glass, or a pencil, but if you show them these articles they cannot name them.

Dr. Gruening said still that he wished to emphasize the point that otologists do not confine themselves to opening an abscess merely through the tympanic cavity and the antrum roof.

Dr. Duel said that in all the cases where he had operated he had removed the squama, and approached the abscess through that portion of the dura. Experience had somewhat altered his judgment in regard to the opening of brain abscess cavity. He now felt that turning back a large flap of dura was a frequent cause of hernia cerebri, and advocated a small opening through the dura into the abscess cavity, if possible, leading from the point of infection through the "stem" caused by the adhesion of dura to the underlying membranes into the cavity.

Dr. Lewis said that he always removed a sufficiently large portion of the squama, so as to obtain plenty of room for operative procedure. In going through the dura he generally made a curved incision, which tended to prevent a hernia cerebri. He generally sewed up a portion of the dura, putting in one or two sutures.

Dr. Kenefick said that he noticed that Dr. Berg spoke of drawing the fluid from the abscess cavity by a syringe. This point had been discussed at otological meetings, and it had been agreed that it was possible to encounter pus of such consistence

that it would not enter the needle of an ordinary syringe. Another point which should be mentioned in connection with abscesses in this region was the possibility of a secondary or multiple abscess. It has happened several times in the last few years that multiple abscesses have been overlooked.

Dr. EAGLETON said that Dr. Berg had spoken of removing three ounces of pus, and in an abscess of that size it would not be overlooked. It had been his unfortunate experience to attempt to drain an abscess by the upper route and to miss the abscess. That would not have been possible had he opened the tympanic bone and gone in below. At that time it was the teaching of Macewen to make a large flap. These cases can only be successfully reached by going through the tegmen tympani.

Dr. BERG said that he was greatly indebted to the members of the Section for the free discussion of the case and for the number of points that had been brought up. As to the question of aspirating with a needle, he thought it a great mistake to use a fine needle. The one he used was practically a trocar, and no pus could fail to enter it. If a needle of that calibre were not available he would make use of a scalpel. As to a hernia cerebri developing after the operation, he had understood Dr. McKernon to say that it only develops after infection, and would like to know to infection of what structure he referred.

Dr. MCKERNON said that hernia cerebri does occur after infection in a great many cases, and certain authors have claimed that it only occurs after infection of the cerebral substance.

Dr. BERG replied that infection of the cerebrum would undoubtedly give rise to hernia cerebri, and that he had seen it several times.

In reference to secondary abscesses that were undrained, he did not see how, with a single abscess of the brain properly drained, at its dependent point, there could be any development of a secondary abscess.

With regard to the size of the opening in the bone, he did not think it mattered how much bone was removed. He had removed as much as four or five inches of a skull, and had used no care to make it of any particular shape or size. He thought that the shape of the incision into the dura was immaterial. It should not be made any longer than is essential for the draining of the abscess.

As to the point brought up by Dr. Gruening, the original method of drainage taught by Macewen was through the squamous portion of the temporal bone. This was rejected by Koerner, who went in through the roof of the antrum, and the tegmen tympani, and it was not until Macewen added to the removal of the roof of the antrum and tegmen tympani the simultaneous removal of the squama that Koerner altered his operation and accepted the Macewen method. Dr. Sachs doubtless had reference to Koerner's original method in his discussion last spring. Dr. Sachs advocates a large opening both for free exposure and for free drainage, and the latter at the most dependent point.

As for missing small abscesses by going in at the upper route, he thought Dr. Eagleton was right, but Koerner suggests that abscesses of the brain are usually close to the bone that has given rise to them. It is his idea that they are due to trouble in the tegmen tympani or roof of the antrum.

Dr. WIENER said that Dr. Berg deserved congratulations for the successful outcome of this case. He thought that the recognition of symptoms which would point so accurately to the localization of an abscess should be noted. The presence of sensory aphasia, the hemiparesis, and the absence of all convulsive seizures of either the general or the Jacksonian type pointed to the temporo-sphenoidal lobe and to its subcortical position. An important point was the presence of the sensory aphasia. A great many cases occur in which, if we would make a more accurate examination, this symptom might be demonstrated. There are cases in which the patient is said to be stuporous, dazed, or bewildered, and yet, if an accurate examination were made and this symptom looked for, it would be noted. In the present case the accurate localization was due to the fact that the symptoms pointed directly to the location of the abscess, and were recognized.

Dr. HERMAN KNAPP inquired whether the eye had been examined, and Dr. BERG replied that there was a very slight optic neuritis discovered. Dr. KNAPP said that examination of the field of vision was frequently of advantage, as hemianopsia indicated an interruption of the optic tract.

Report of a case of thrombosis of the lateral sinus and complete obliteration of the internal jugular. EMIL GRUENING, M.D.

The patient was a young girl sent to the hospital by Dr. H. W. Berg, who had seen her in consultation. She had symptoms which he recognized as due to thrombosis of the lateral sinus, and he sent her to Mt. Sinai for treatment.

The patient gave a history of having repeatedly had a temperature of 106° and more, oscillating to normal, and accompanied by chills and vomiting. In the intervals between the attacks she seemed to be quite well. She said she had had no discharge from the ear so far as she knew. Two weeks previously the ear had pained somewhat, and then the chills and vomiting occurred.

The ear was examined and showed a small opening in the drum, but no discharge. The mastoid was not tender. The pupils were irregular, one being wide and the other small, and there was a pronounced optic neuritis; the neck was tender and there were large glands near the jugular vein, and the external jugular was very large. The patient had no fever, her temperature being only 100°.

With the tenderness in the neck, the optic neuritis, and the perfect well-being upon which she prided herself, a diagnosis of sinus thrombosis was established. The mastoid was hard; there was no cell, only a large antrum; the whole mastoid was eburnated, and the antrum was filled with cholesteatomatous material and pus. A perforation of the posterior wall of the antrum led to the sigmoid sulcus and allowed the pus to accumulate there. There being no cells, there was no tenderness, and mastoid disease was not suspected. The pulsation of the sinus was quite plain. The bony covering of the sinus was removed and a **perisinuous abscess** was found. The sinus was found to be plugged. Without removing the thrombus, the jugular vein was dissected, and was found to be completely obliterated. No plug was found in the jugular although the exploration was carried clear down to the clavicle. The whole jugular was obliterated from the angle of the jaw to the clavicle. The jugular was removed, and then the thrombosis, which extended into the lateral sinus about half way to the torcular. When all of the thrombus had been removed there was bleeding from above but none from below.

In looking over his hospital cases Dr. Gruening found that in all the instances where the jugular had been obliterated and the clot below could not be reached, the patients had died, and he naturally made an unfavorable prognosis in this case also.

Upon consultation with Dr. A. A. Berg, however, it was de-

cided that if the patient did not do well, the clavicle should be lifted and the jugular followed into the subclavian region, in order to try to reach the clot. *Fortunately, the patient recovered and is now up and about.* The operation was performed on the 17th of October, now three weeks ago, The patient has still about as much optic neuritis as at first, but this recedes very slowly and otherwise she is quite well.

Dr. HARRIS inquired what was the condition of the middle-ear, and also whether this procedure which was referred to had been done experimentally or clinically. He was entirely unacquainted with it.

Dr. LEWIS said that some time ago he had reported a case where the jugular was obliterated and the clot extended into the subclavian vein. The patient was in extremis at the time of the operation and died four hours following the operation. He was quite positive that the clot extended into the innominate vein and felt at the time that the operation was incomplete, but to go further would mean the death of the patient on the table. He had inquired of several surgeons as to the methods to be pursued in similar cases, but could not find one man who had ever gone down into the subclavian vein and explored and tied it.

Discussion on Dr. GRUENING'S case of **thrombosis of the lateral sinus and obliteration of the internal jugular.**

Dr. H. W. BERG said that he did not know that he could add much to Dr. Gruening's extensive and special report, except for the interest that the case had for him from a diagnostic and general medical standpoint. He had seen the case but once in consultation outside the hospital. The attending physician had considered it a case of possible typhoid or cerebro-spinal meningitis; the latter possibility he based upon the fact that the patient lay in bed with a very rigid neck. However, Dr. Berg found the rigidity more like that of Pott's disease than spinal meningitis, both sides of the neck being held tense and rigid,—the patient keeping the back and side muscles of the neck intensely contracted to prevent the moving of the spinal column for fear of the pain resulting from such movements. The patient did not give Dr. Berg the impression of having typhoid fever, although the temperature curve was compatible with either typhoid or cerebro-spinal meningitis.

Upon examination of the mastoid Dr. Berg found no tender

ness or pain and no swelling ; however, in passing his finger over the side of the neck he found a rigid line extending from the front of the mastoid tip down to the clavicle, and it was upon this rigid line in the location of the jugular that he based his diagnosis of jugular phlebitis,—possibly an obliterating phlebitis, with the clot filling up the vein. The feeling was that which we obtain in an obliterating phlebitis, or a phlebo-sclerosis in any other part of the venous system. The most interesting feature was the hardness of the vein, and the readiness with which a diagnosis of thrombosis in the jugular vein could be made. The cerebral symptoms together with the septic temperature curve prompted the additional diagnosis of sinus thrombosis. He had been very fortunate in securing an immediate bed in the hospital for this patient, and prompt and careful operative treatment by Dr. Gruening, for without the aid and skill thus secured she would have died in a very short time of her septic sinus jugular thrombosis.

Dr. LEDERMAN said that he would like to know Dr. Gruening's method of the after-treating of the wound. A few years ago he had reported a case where the clot extended into the subclavian vein, and he had ligated the vein without resetting same, leaving the neck-wound open. A re-infection of the sinus toward the torcular occurred, rendering necessary other operations within ten days, but the patient recovered, although the infections were very severe. At one time the temperature was as high as 106°, with repeated chills.

In this instance the region of the jugular bulb had been exposed and thoroughly cleansed. The internal jugular vein was much contracted and difficult to find. The speaker desired to learn if any of the gentlemen present had employed the method of Ballance, *i. e.*, in bringing the remaining portion of the jugular vein out of the upper part of the neck wound, and permitting drainage externally, the remaining portion of the wound being sutured.

Dr. RICHARDS said that he understood Dr. Gruening to say that while the sigmoid sinus and jugular bulb were blocked, the jugular vein was collapsed, though it contained no thrombus. This class of cases had been of particular interest to him because the clinical phenomenon of collapse of the jugular without thrombosis threw considerable light upon the excursion made by the jugular during the respiratory act, *i. e*, the manner in which

the vein is filled and emptied. To appreciate the conditions causing collapse in these cases, we must consider certain hydraulic factors which influence the sinus system.

The question first arises: "Why, with the jugular and its branches unobstructed by thrombi, is there no blood-flow through these vessels?" The mere condition of jugular collapse argues that the side tributaries to the jugular exert little primary influence in opening or keeping open this vessel after inspiration has obliterated its lumen. How, then, does the vein open, as through the tenuity of its walls it is incapable of opening itself? In the architectural arrangement of the bulb we find the mechanism which is largely responsible for the act. First the upper portion of the jugular is capped by a "cornucopia" with its base held up as a receiving cup to the jugular bulb. The incollapsible character of this funnel, together with the fact that its apex is directed into the upper end of the jugular, allows the stream of blood from above to impinge against the collapsed tube, "end on." The columns of blood to the side tributaries to the jugular enter at disadvantageous angles and impinge upon a collapsed tube, which acts as a "bumper." This blood can gain no entrance until the jugular has been opened or "inflated," so to speak, by the current from above.

A second factor which renders the cornucopia which caps the jugular a highly efficient mechanism is the current of the inferior petrosal sinus which enters on its inner wall and shoots its current directly into the apex of the funnel. The current of the inferior petrosal is a positive factor in prying open the collapsed upper end of the vein upon the end of the inspiratory act.

At the same time that the jugular is being opened from above downward through the influence mentioned, it is also being opened from below upward by blood regurgitating from the deep portion of the jugular in the neck. The valve in the lower portion of the jugular, as has been demonstrated upon recent cadavers, does not completely prevent regurgitation, but allows of a physiological regurgitation, as do certain heart valves. The wave opening the jugular from below upward meets the wave coming from above downward, and as the respective waves open the collapsed vein, and as the points of entrance of the side tributaries are passed, these latter vessels then, and not until then, pour in their volumes to the best advantage.

When, therefore, through thrombosis, the jugular bulb and the

inferior petrosal sinus become blocked and the "funnel" action of the cornucopia abolished, we have the clinical phenomenon of collapse of the jugular without thrombosis. The side tributaries not infrequently partake of this collapse. I have seen the facial obliterated for some distance from the jugular. It will be found, as a rule, in these cases that the collapse of the jugular extends down to the highest point reached by the regurgitated wave from below. Given the element of time, the collapsed walls of the vein eventually become sealed and pass into the condition of a cord.

The obliteration of the jugular tree through the above influences is in reality a beneficial outcome, as the general collapse tends to block sepsis from the system. The conditions, however, which bring about collapse, suggest extreme invasion—that not only the bulb is blocked, but that the by-paths to the bulb are blocked also, avenues surgically inaccessible. It is for this reason that not only the mortality is high, but that death is due, as a rule, not to general sepsis, but to meningitis or some other intracranial complication.

Dr. GRUENING, in closing the discussion, replied to Dr. Harris's question by stating that Grunert proposed the operation of sawing through the clavicle. In some cases he has been able to remove the clot. If this case had not done well he would have resorted to this method. It has been practically tried and found useful.

In response to Dr. Lederman's inquiry, Dr. Gruening said that there was a large infected area from the clavicle to the bulb, and in order to drain thoroughly he left the wound open and packed it with iodoform gauze.

The lumen had become closed, but there was no thrombus in the vein, and the same condition prevailed in the facial vein, which had also collapsed. The condition went much farther than the clavicle.

He had been very agreeably surprised at the favorable outcome of the case. The girl had a fever for a few days, but that was due to a local abscess. On introducing the dressing forceps into the region of the bulb a tablespoonful of pus escaped, but after that the recovery of the patient was uneventful. In future he would be more ready to look for good results in these cases.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

By Dr. THOMAS J. HARRIS, Secretary.

MEETING OF NOVEMBER 27, 1906.

Dr. Duel reported a fatal case of **cerebellar abscess** and exhibited the brain. The patient was a woman, who came to the hospital with a history of chronic middle-ear disease, and complained of pain in the right side of the head. There was a fetid discharge in the right ear. No tenderness shown over the mastoid. Operation was refused, and she left the hospital. Two days later she was admitted in a semi-comatose condition. Morphine had been administered by some physician outside. When seen by Dr. Duel there were slow respirations, narrow pupils, a pulse of 60, and a subnormal temperature. The patient died two hours later. The autopsy showed an abscess of the right lateral lobe of the cerebellum. Infection had taken place from the wall of the lateral sinus. There was no clot in the sinus, but it was bathed in pus.

Dr. Harris inquired as to the condition of the inner ear. All recent authorities lay stress on the frequency with which cerebellar abscess is found associated with disease of the inner ear.

The Chairman referred to the statement of Mr. Ballance at the recent meeting of the American Medical Association that cerebellar abscess was about twice as frequent as cerebral abscess. His statistics were quite different. In thirteen cases reported, it was three to one in favor of cerebral abscess.

Dr. Gruening showed the clamps used by Jansen for closing the mastoid wound. These were not new, but had never been used by him till this fall. He now employed them with much satisfaction.

Discussion.—Dr. DUEL said that he had used them, but that his experience was not so pleasing.

Dr. LUTZ presented photographs of cabinets used by him in his office.

Dr. MCKERNON reported a case of **accidental wounding of the internal carotid artery** in the course of a Schwartze-Stacke operation. The patient was a child of fourteen, who suffered from chronic middle-ear disease and mastoiditis. The usual incision was made and the mastoid was found broken down. The operation was completed, except cleaning out the mouth of the Eustachian tube. A sharp curette (used on account of the amount and character of the bone) was introduced, and several pieces of bone removed. Suddenly it was felt to break through the anterior wall. There followed immediately an alarming flow of blood. This was checked by firm tamponing; no recurrence of the bleeding when the dressing was removed on the fifth day. The hemorrhage undoubtedly was from the internal carotid artery.

Discussion.—Dr. GRUENING stated he was in the habit of using a dull ring curette, which he thought was safer.

The CHAIRMAN thought that the direction of the curette, always anteriorly and above, was the safe one. He referred to a case where he had wounded the jugular bulb in the course of a radical operation. Pressure controlled the copious bleeding. Recovery was uneventful. The abnormal position of the bulb had been suspected from a slight elevation on the floor of the canal.

Dr. DUEL reported a case of **mastoiditis** and **perisinuous abscess** complicated by the presence of sugar and albumen in the urine. These both cleared up after the operation. The question suggested itself whether the sugar was due to excessive intracranial pressure.

Discussion.—Dr. GRUENING thought sugar was always an unfavorable symptom; most of his cases died.

Dr. QUINLAN reported that he had operated during the past six years on four cases of **acute mastoiditis** that was complicated with diabetes: Two male adults, forty-five and thirty-seven; one young girl, fifteen; one woman, sixty-five. Chloroform used in all cases. Recovery followed without serious complication.

Dr. GRUENING thought that when the bone alone was in-

volved, and not the soft parts, the prognosis following operation was better. He raised the question whether the presence of sugar should not always make us hesitate to operate.

The CHAIRMAN thought that the presence of diabetes did not warrant delay in a necessary operation.

Dr. SHEPPARD had had four cases, two of which recovered, though the wound was slow in healing. The third case died as a result not of the diabetes but from infection. The fourth case, one of acute middle-ear suppuration following bathing, showed no sugar at the time of the operation, but a specific gravity of 1.034. Immediately after the operation, however, the urine showed a large amount of sugar. The operation revealed a large cavity in the mastoid, but a healthy sinus. The patient did well for five or six days, but later developed a general septicæmia and died. Dr. Sheppard agreed with Dr. Gruening that diabetes was distinctly an unfavorable symptom, and operation should be undertaken with deliberation.

Dr. MCKERNON had seen six such cases in the past three (3) years, two died of diabetic coma within forty-eight hours after the operation. One of the fatal cases had been under close observation for some time, and operation was only decided upon as the lesser of two evils.

The CHAIRMAN spoke of a case of his where recovery had taken place even after erysipelas had developed.

Dr. DUEL reported a case of **exposure of an anomalous facial nerve** in the course of an operation upon a diploic mastoid. The nerve was uncovered for a space of a quarter of an inch without any injury resulting, though it was touched, and the facial muscles responded vigorously several times. The cells in front of and internal to the nerve were full of pus.

Discussion.—Dr. TOEPLITZ referred to the possibility of wounding the nerve in an operation for acute mastoiditis. He had heretofore thought that this was not possible, but he had recently seen such a case.

Dr. BERENS spoke of having had a similar case.

Dr. QUINLAN referred to a case of **chronic suppuration** operated on about five weeks ago, in which a facial paralysis developed on the third day after operation. Paralysis slightly improving at present, but still in evidence when patient laughs or attempts to whistle.

The CHAIRMAN stated that this might occur as late as the

fifth day. It was due either to pressure from the packing or to infection. They always got well.

Dr. SHEPPARD asked if pre-operative paralysis was a particular indication for operation. He had seen several such cases which had promptly recovered.

The CHAIRMAN said one of his worst cases of facial paralysis had developed without any twitching of the face during the operation.

Dr. GRUENING thought that it was important not to cover the face too much. He does not rely upon the anæsthesist to watch the face.

Dr. KENEFICK inquired if in the experience of those present any one had succeeded by the radical operation in clearing up a facial paralysis of long standing and dependent upon the purulent disease of the ear.

The CHAIRMAN had seen one such case where recovery took place several months after the operation. At the time of the operation there was no response in the nerve to any mechanical stimuli. The paralysis developed two years before the operation as a result of an operation for acute mastoiditis in the hands of another surgeon.

Dr. BRYANT reported a case of **oto-cerebellar abscess** seen in consultation. Child five years old; operation—mastoid cells opened for fetid otorrhœa with mastoid tenderness and high temperature. Sixth day—daily temperature reaches 105°, stupor, temporo-sphenoidal lobe explored, nothing found. Twelfth day—seen in consultation, slight nystagmus, temperature ranging high, some rigidity of neck, stupor, foul purulent discharge and necrosis of wound. No sign of sinus thrombosis. Fifteenth day—opened a thrombosed suppurative sigmoid sinus and internal to it a very large necrotic cerebellar abscess. A slight remission of symptoms. At the subsequent dressings a considerable amount of dark, foul necrosed detritus was evacuated from the cerebellum, followed by flow of 1 to 3 drams of clear cerebro-spinal fluid. Twenty-first day—death. Autopsy findings—Weight of brain 1080 grams. Brain is injected on cortex. At base covered with thick, yellow pus, and fibrin. The portions of the brain lying next the mastoid operation opening are deficient and necrotic, covered with pus, and an abscess cavity large enough to admit two fingers extends laterally through left lobe of cerebellum, across the commissure (where it is separated

by a thin lamina only, if at all, from the fourth ventricle) and half way into right lobe. All ventricles are distended, with thin layer of pus on walls. The condition of the sinuses not attacked at the operation seems good.

Dr. GRUENING had seen fluid follow in a case of temporo-sphenoidal abscess where recovery had taken place.

Dr. GORHAM BACON reported the following case: Patient seen in consultation who gave the following history: Three years ago he complained of deafness and a ringing noise in both ears, with slight attacks of dizziness and vomiting at the onset of each attack. Bone-conduction was decidedly defective in both ears. He contracted syphilis ten years ago. Blisters were applied over each mastoid and he was given increasing doses of iodide of potash. Later hypodermic injections of pilocarpine were given in sufficiently large doses to produce the therapeutic effect. He improved under this treatment and the Doctor did not see him again until the past summer when he again complained of most violent attacks of dizziness with vomiting. The hearing for the watch was completely gone and the bone-conduction very much diminished. For three months he was placed on inunctions of mercury with some improvement, until quite recently when he became much worse again. When I saw him on November 22d he was very much depressed in mind and there was no question of involvement of the labyrinth on each side. The bone conduction was practically gone. I advised continuing the inunctions over each mastoid, and commencing again the hypodermic injections of pilocarpine.

I report this case to find out the views of the members of the Society as to the value of **pilocarpine in cases of syphilitic deafness**. According to my experience we should use this remedy as soon as possible after deafness comes on in order to obtain the best results.

Discussion.—Dr. WILSON had seen the ear become involved in syphilis where the patient had been taking mercury and iodides for a year and a half.

Dr. BERENS felt that only when enormous doses were given would we get good results. He gives as high as 480 grains a day in peptonized milk one hour before meals, thus not to upset the stomach.

Dr. QUINLAN reported a case of deafness with vertigo and

tinnitus of seven years' standing that was improved by hypodermic injections of pilocarpine. The dose was started at $\frac{1}{12}$ and increased until $\frac{1}{4}$ was reached. Patient relieved of vertigo and subjective noises improved as well as hearing.

Dr. EMERSON's experience was that in congenital syphilis the iodides in large doses do harm, while in acquired syphilis they do good.

Dr. HARRIS referred to a case under his care at present where pilocarpine administered in $\frac{1}{4}$ grain doses had been of great benefit. The interesting feature of the case was that sexual intercourse always brought back the deafness.

Dr. GRUENING was in the habit of giving it by the mouth at bedtime in a cup of tea. He gave only enough of the drug to secure sweating. Salivation was a favorable symptom from it, in cases of acute labyrinthine deafness.

Dr. BERENS dwelt upon the importance of free absorption of the iodides. To secure this, he was wont to order Turkish baths to open pores of the skin, and administered the iodides upon an empty stomach.

The CHAIRMAN was of the opinion that in such cases both the iodides and pilocarpine should be given.

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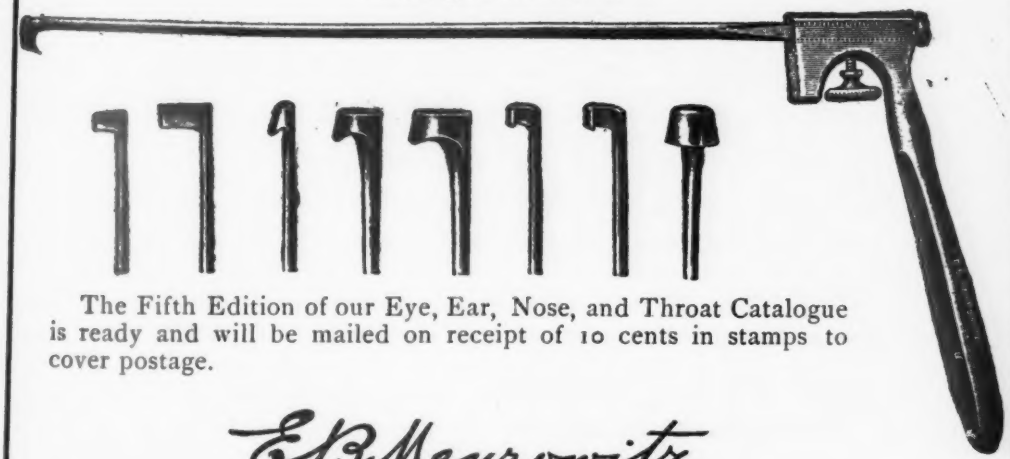

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